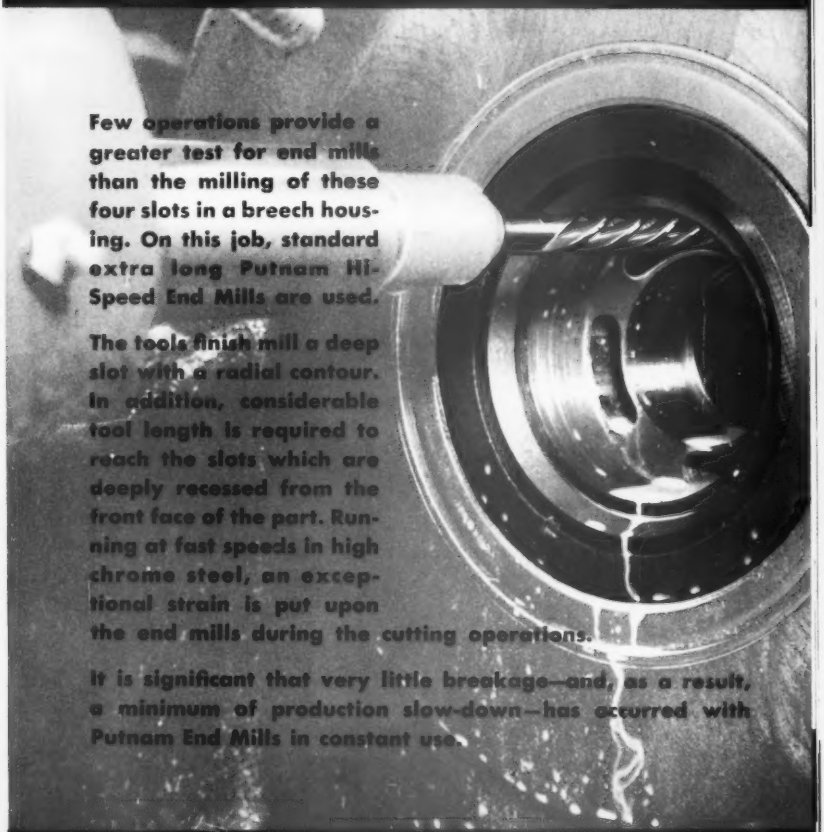
The TOOL & DIE Journal
Tool-Die-Machine PROGRESS

UNUSUAL DEPTH...SPECIAL CONTOURS
...A Job For Putnam End Mills



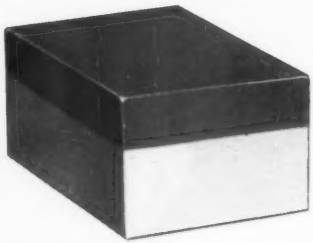
Few operations provide a greater test for end mills than the milling of these four slots in a breech housing. On this job, standard extra long Putnam Hi-Speed End Mills are used.

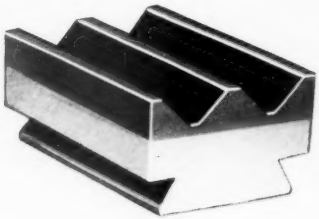
The tools finish mill a deep slot with a radial contour. In addition, considerable tool length is required to reach the slots which are deeply recessed from the front face of the part. Running at fast speeds in high chrome steel, an exceptional strain is put upon the end mills during the cutting operations.

It is significant that very little breakage—and, as a result, a minimum of production slow-down—has occurred with Putnam End Mills in constant use.

PUTNAM TOOL COMPANY
2985 Chesterfield Avenue Detroit, Michigan

NEW WAY TO CONSERVE HIGH SPEED STEEL





Dovetail forming cutters made from FCC Electrically Welded Composite Steel Blanks *(high speed steel cutting face; mild steel base)* **save at least 50% of high speed steel. Besides, they offer other distinct advantages. Obvious among them are:—**

1. Non-hardenable, tough base minimizes tendency to crack and break out at sharp dovetail corners and screw holes during heat treating or when working.

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3. More prompt delivery because of reduced amount of high speed steel.

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The TOOL & DIE Journal

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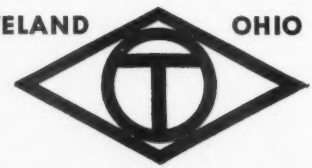
CLEVELAND OHIO



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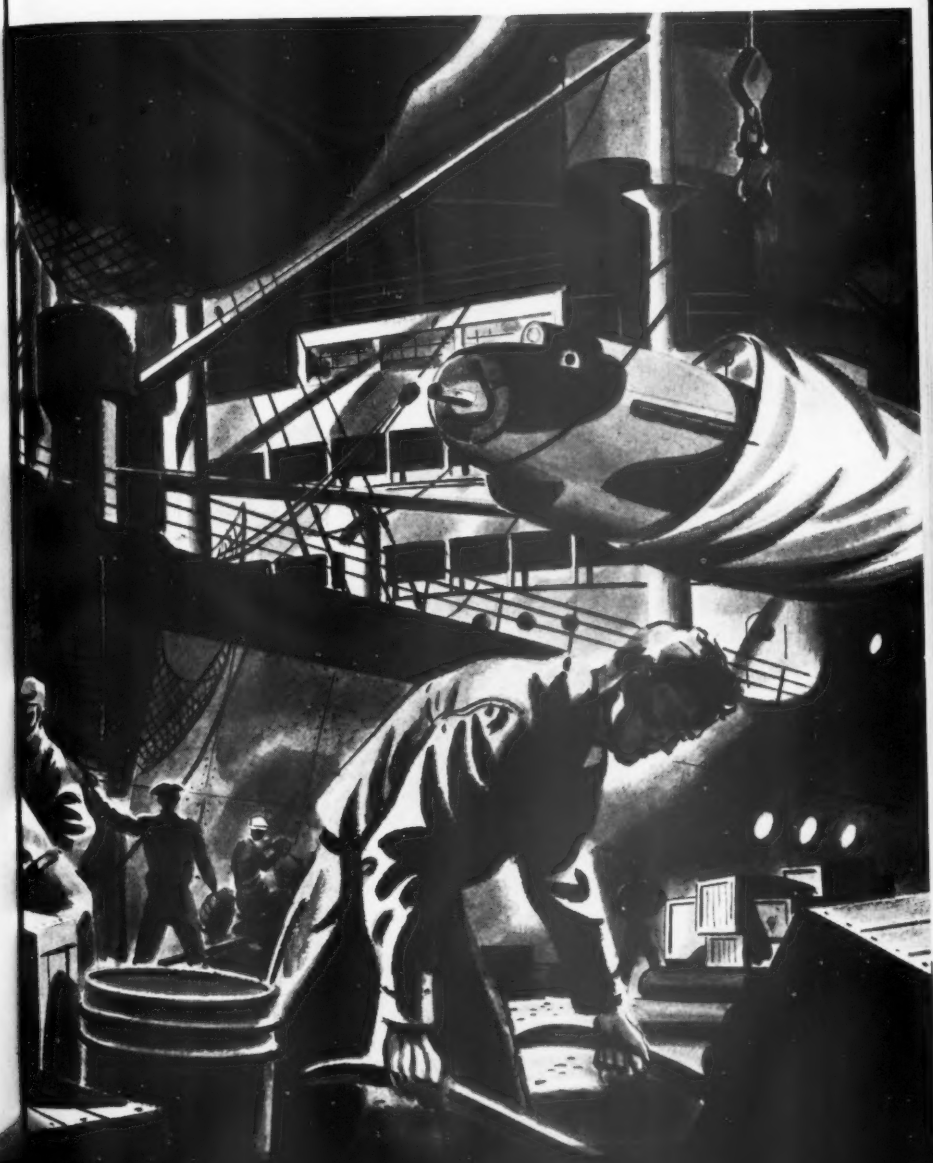

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FOR USERS
WHO TIP THEIR OWN
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PART—Special Countersink.
MATERIAL—High-Speed Steel.
GRINDING WHEEL—4" Dia. with 1¼" Hole.
OPERATION—Grind Point.
HOLDING—Collet Type Tool Head.
GRINDING TIME—8 to 10 Min.

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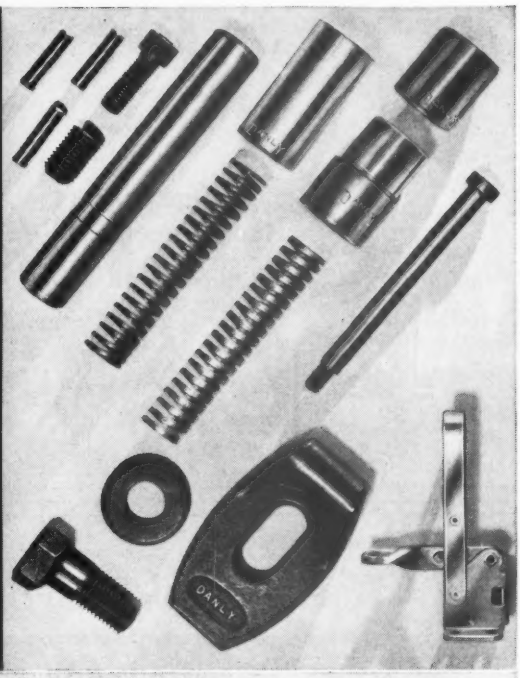

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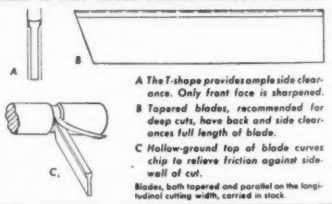

A The T-shape provides ample side clearance. Only front face is sharpened.

B Tapered blades, recommended for deep cuts, have back and side clearances full length of blade.

C Hollow-ground top of blade curves chip to relieve friction against sidewall of cut.

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The Blades that reduce friction

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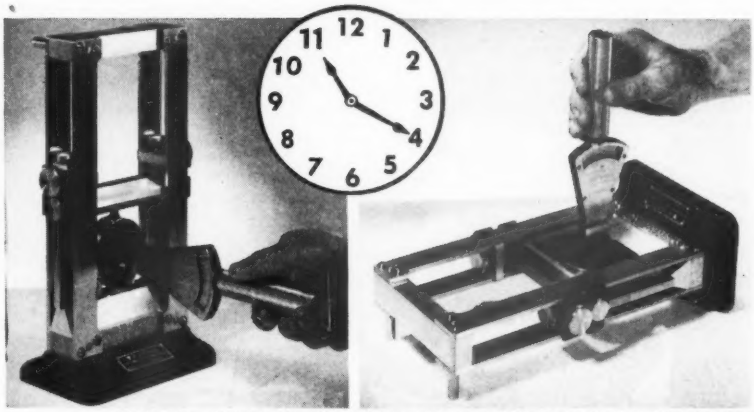

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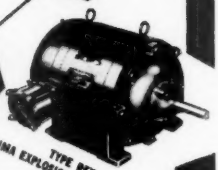
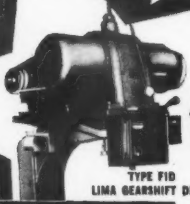


TYPE REX
LIMA EXPLOSION PROOF MOTOR



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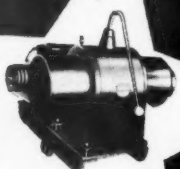

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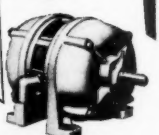

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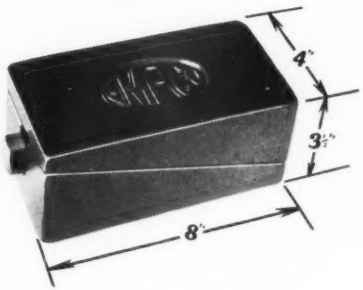
with EMPCO JACKS



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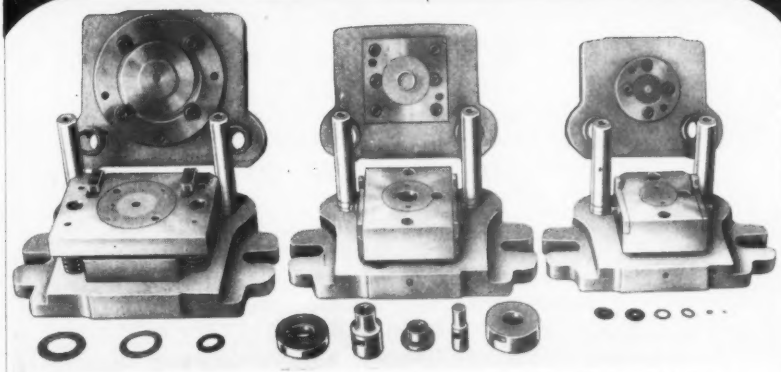
The Story of HOVIS
UNIVERSAL WASHER DIES



Capacity 2½" Dia. Capacity 1½" Dia. Capacity ¾" Dia.

THE OUTSTANDING TIME AND MONEY-SAVING METHOD OF PRODUCING WASHERS

THE VERSATILITY AND EASE OF CHANGEOVER MAKE THESE DIES A VALUABLE ASSET TO THE MANUFACTURER OF RADIOS, ELECTRIC EQUIPMENT AND AIRCRAFT PARTS.

FIVE SIMPLE, INTERCHANGEABLE PARTS ARE ALL THE SPECIAL TOOLING REQUIRED TO MAKE A NEW SIZE OF WASHER.

THE VARIOUS INTERCHANGEABLE PARTS CAN BE REMOVED AND REPLACED BY THE USE OF STANDARD HEXAGON SOCKET SCREW WRENCHES WITHOUT DISMANTLING THE DIE IN ANY WAY, THE CHANGE BEING A MATTER OF MINUTES. ALL OF THESE PARTS ARE HELD IN BY THE HOVIS PUNCH RETAINING MECHANISM.

HOVIS SCREWLOCK COMPANY

8100 E. Nine Mile Road - Van Dyke, Michigan

Suburb of Detroit *Phone: Centerline 1575*

Regrind Even Scores of Times

Today the most solemn issue is Unity of Purpose. Adaptability becomes a blessing. Duty is intensified by facts. Production persistently heads the worksheet. And "save" is an hourly command.

With the spirit of conserving STEEL, TIME, LABOR, and MONEY, the Severance Tool Company increasingly serves the Metal, Wood, and Plastic Industries with small Rotary Power Tools for Fitting and Finishing. Supplanting ordinary Rotary Files, MIDGET MILLING CUTTERS in standard shapes and sizes are available with little or no delay. Cooperate with National Needs by ordering less than you believe you require; then enjoy at least an equivalent compensation, plus hidden savings through "Regrinding", which removes only about .004 of an inch.

Regrinding revolutionized the field of Rotary Files and Severance has regrinding histories of upwards to the unheard-of-figure of eighty times. Contact Severance and try a cutter. These are trying times.

"Chatterless" Countersinks, Tube Deburring Cutters, and Engineering Service for Special Tools also await your request. Pacific Coast users and prospects may address Severance Tool Company, 3844 South Santa Fe Avenue, Los Angeles, California.

SEVERANCE
TOOL COMPANY
Saginaw, Michigan
1506 East Genesee Avenue

MIDGET MILLING CUTTERS
"Ground from the Solid after Hardening"

MASONITE* DIE STOCK

ACCURATE, DURABLE, PERMANENT

WIDELY used by aircraft builders in the manufacture of dies and fixtures for processing sheet metal, Masonite Die Stock also makes an accurate work surface for the assembling of bulkhead fixtures.

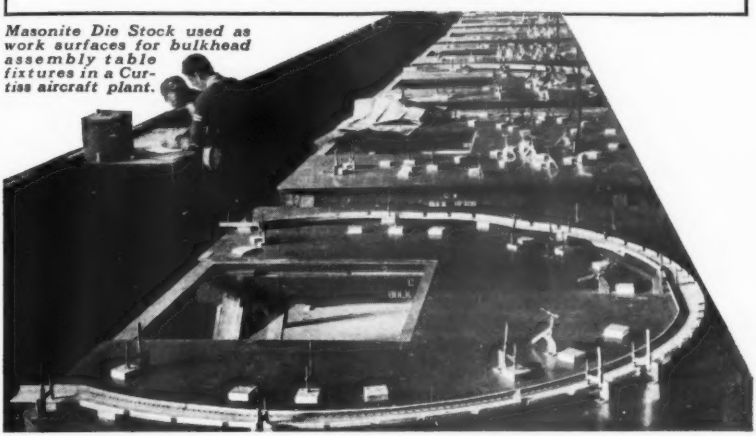
This smooth, durable material combines light weight with great strength, gives long service at low cost. It can be drilled, tapped, and will stand abrasion. Fixtures can be moved easily.

A highly moisture-resistant material without the grain of natural wood, Masonite Die Stock has inert qualities similar to metals, yet can be installed with wood-working equipment.

While its most spectacular success is being demonstrated in the aircraft industry today, Masonite Die Stock is also being used by other manufacturers where accuracy, durability and permanence are required.

Masonite Die Stock is available in thicknesses of ¼ to 2 inches . . . in sizes of 48 x 72 inches and 48 x 144 inches. For further details, fill out and mail coupon below.

Masonite Die Stock used as work surfaces for bulkhead assembly table fixtures in a Curtiss aircraft plant.



*TRADE-MARK REG. U. S. PAT. OFF. "MASONITE" IDENTIFIES ALL PRODUCTS MARKETED BY MASONITE CORPORATION. COPYRIGHT 1942, MASONITE CORP.

MASONITE CORPORATION

Dept. TD-6, **111 West Washington Street, Chicago, Ill.**

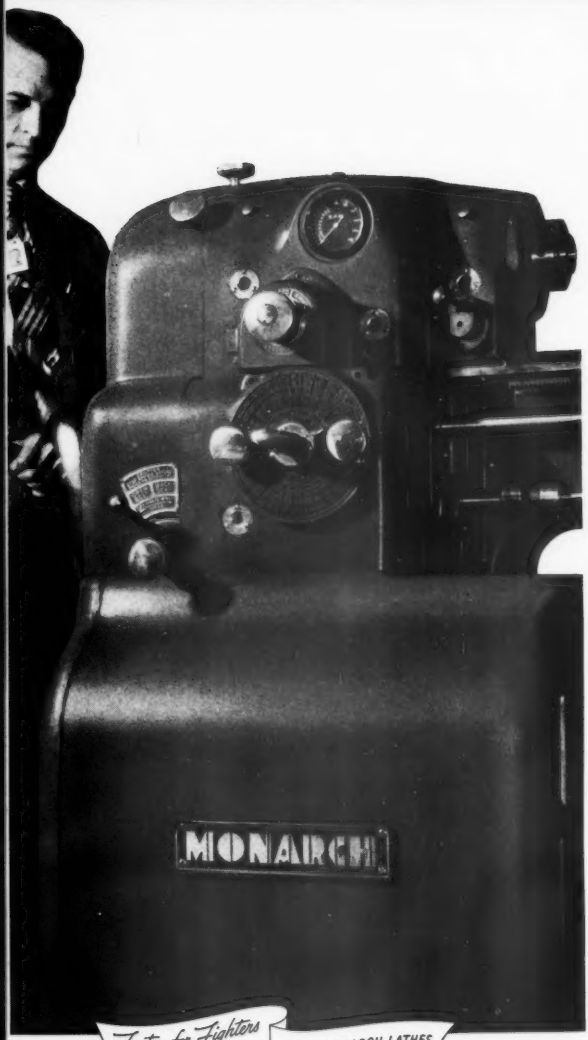
Please send me illustrated literature and complete information about the new Masonite Die Stock.

*Name and firm*_____

*Address*_____

*City*_____ *State*_____

WE'VE PUT ON "War Paint"



INDIAN WAR PAINT in brilliant colors gives way to today's program of stripping all nonessentials from our War effort. Complying with instructions from the War Production Board, Monarch and other machine tool builders are eliminating everything except protective painting, to save materials, man-hours and to quicken deliveries.

But under this changed surface, Monarch lathes perform just as efficiently as always. They are up in the front lines of our production effort, taking the burden of continuous operation in many plants —helping to deliver the implements of Victory, *faster for fighters.*

We promise you that when Victory is won and restrictions are lifted, we'll again make your Monarch lathes as handsome in their peacetime appearance as they will be useful in their peacetime performance.

THE MONARCH MACHINE TOOL COMPANY
SIDNEY • • • OHIO

Faster for Fighters WITH MONARCH LATHES

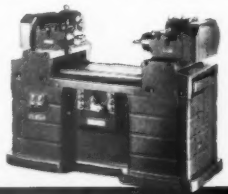
MONARCH LATHES

COVER THE TURNING FIELD

WINNING THIS WAR IS EVERYBODY'S JOB

Thousands of new workers are pouring into factory doors to help produce the billions of dollars' worth of material vitally and immediately needed to win this war . . . sufficient long-experienced operators are just not available . . it's a time when a modern type of standard machine tool like the Ex-Cell-O Precision Boring Machine can meet the emergency by doing a dual job: its easy control and automatic operating features make it possible to train ordinary operators in an exceptionally brief time to bore, turn, face, groove metal parts to the highest commercial standards of precision in size and finish, with a minimum of operator fatigue; this ease of operation, combined with basically sound engineering design and substantial, rigid construction for which all Ex-Cell-O machine tools are noted, *assures the extreme in production, every hour, every day.*

Below. Standard Double-End Ex-Cell-O *Precision* Boring Machine—used for many multiple and progressive operations, on the same part or various parts, to speed up war production.



EX-CELL-O CORPORATION • DETROIT, MICHIGAN

XLO

EX-CELL-O *means* PRECISION

Precision THREAD GRINDING, BORING AND LAPPING MACHINES, TOOL GRINDERS, HYDRAULIC POWER UNITS, GRINDING SPINDLES, BROACHES, CUTTING TOOLS, DRILL JIG BUSHINGS, PARTS

Why This New
TAPPING UNIT
Produces BETTER Tapping at LOWER COST

Procunier Universal Tapping Machines give increased output, more accurate tapping and tremendously increased tap life. The features that make this possible include: 1. Four Speeds, ranging from 390 to 2050 R. P. M., efficiently handle jobs for which conventional high speed tapping machines are inadequate. 2. One machine handles tap sizes from No. 2 to ½" through two interchangeable heads. 3. Extra long Spiral Compensating Springs conveniently located, with wide range hand-screw adjustments, maintain pre-set tap feeding and reversing pressure INDEPENDENT OF OPERATOR.

Tap establishes its own lead!

The new Procunier Universal Tapping Machine is exclusively designed so that it actually allows the tap to establish its own lead. There is nothing more accurate than a precision ground thread tap as a guide for tapping—so maximum tapping efficiency is attained where an accurate tap is free to establish its own lead in cutting the thread.

This exclusive Procunier feature means more accurate tapping with every thread uniform, greater production with less spoiled work and less tap breakage.

SEND FOR BULLETIN giving full details, description and prices on the full line of Procunier Universal Tapping Machines, hand, foot or air-operated, the complete line of Procunier Precision Tapping Heads to meet all needs and the new Tru-Grip Tap Holder.

Procunier Safety Chuck Co.—12-14 S. Clinton St.—Chicago, Illinois

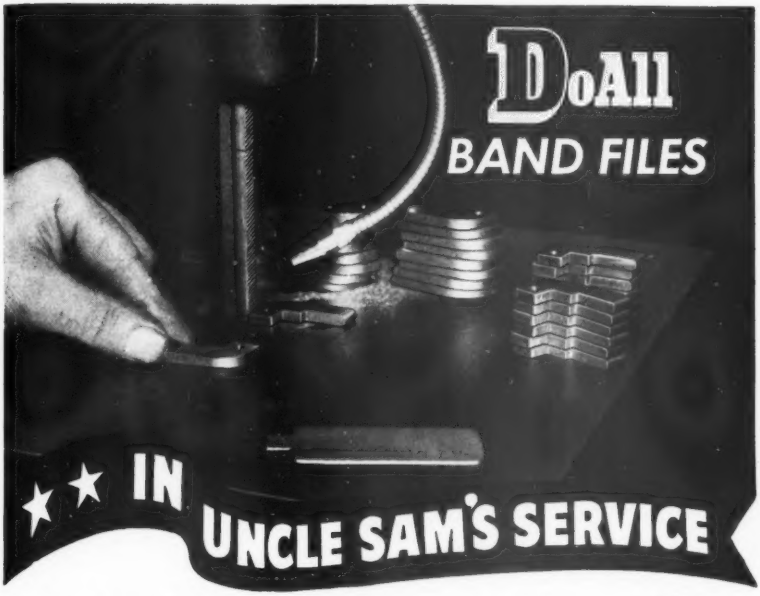
Send me Bulletins on: / / High Speed Tapping Heads / / Tru-Grip Tap Holders / / Universal Tapping Machines.

Name .....

Address .....

City ..... State .....

PROCUNIER SAFETY CHUCK CO.
12-14 S. Clinton St., Chicago, Illinois



Picture above was taken in a mid-western plant, where difficult production filing of machine gun stripper links and cartridge stops is done faster and better with DoAll Band Files.

SEE HOW DoAll File Bands WORK

● Since Pearl Harbor, DoAll Band Files, perfected long ago for high quality peace-time filing, are now on regular war schedules in hundreds of plants, turning out needed materials for army, navy and air corps.

DoAll Band Files are 8 times as fast as hand filing, 5 times as fast as jig filing. Operating in one direction only, they last twice as long as 2-way stroke files.

LARGE ASSORTMENT

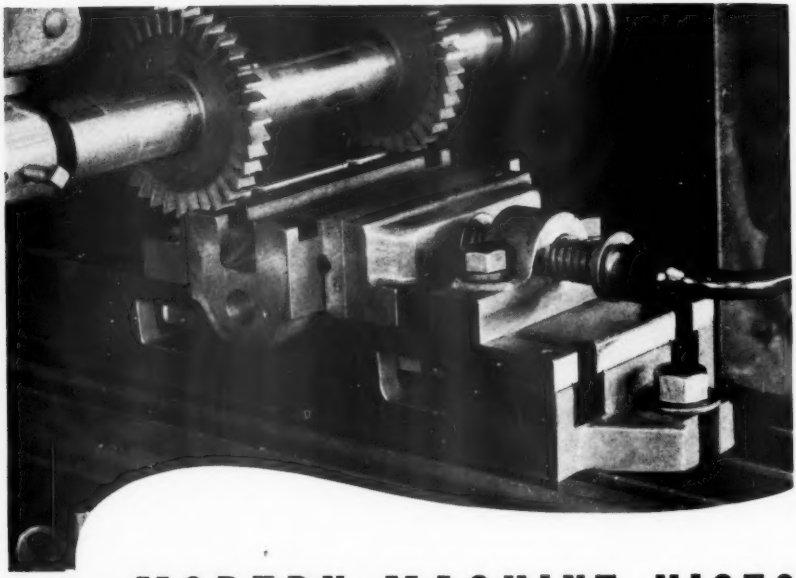
There are 23 sizes—a width, cut and style to take care of anything from high carbon steel to hard rubber.

Send for new File Booklet Today.

THE DOALL COMPANY

1203 Thacker St. -:- Des Plaines, Ill.

Associated with Continental Machines, Inc., Minneapolis, Minn.



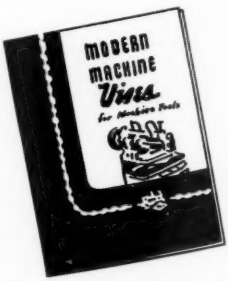
MODERN MACHINE VISES

Modern production methods in up-to-date Tool rooms and Die shops require precision tools.

The Producto MODERN MACHINE VISES include plain and swivel, screw-acting types—4½" and 6"; also Production Vises—quick-acting—for production milling and drilling in three sizes, 4", 5" and 7".

Increased production capacities enable us to offer these vises for prompt delivery.

A new 8-page Catalog describing and illustrating this complete line of MODERN Vises for use in milling, drilling, grinding, etc., is now ready. Send today for your copy.



THE PRODUCTO MACHINE CO.

990 HOUSATONIC AVE. BRIDGEPORT, CONN.

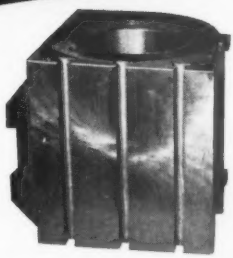
BLANCHARD

PUT IT ON THE BLANCHARD

CHECK THESE ADVANTAGES OF BLANCHARD GRINDING

★ Production
Adaptability
Fixture Saving
★ Operation Saving
★ Material Saving
Fine Finish
★ Flatness
★ Close Limits

★ . . . . . *Especially valuable on jobs like the one illustrated.*



Semi-Steel
Stock per side ⅛"
Limits ±.005"
square .001"
to .0015" in 16"

No. Sides 6
1 piece (6 surfaces)
1 hour and 35 min.

Grind LARGE WORK flat, square and parallel

THE SHAPER TABLE, 15½" x 16" x 16", illustrated here, is an excellent example of large, heavy work which may be ground with ease on a Blanchard No. 18 Surface Grinder with 6-inch extended column. These tables come to the Blanchard as rough, semi-steel castings. Six sides are ground, ⅛" stock being taken off each side.

The **BLANCHARD**
MACHINE COMPANY
64 STATE STREET, CAMBRIDGE, MASS.

Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

TOOLING FOR WAR PRODUCTION
Back of the planes and tanks and guns—back of our entire war program—stands the man behind the machine. In the toolroom of a large aeronautical plant, this craftsman at a South Bend Lathe is doing his part in defending America.
HOW TO RUN A LATHE

The Man Behind— the Man Behind the Gun!

"HOW TO RUN A LATHE"

A practical reference book on the operation and care of metal working lathes for beginners and apprentices. Valuable as a shop text for training classes. 128 pages, 5⅛″ x 8″, 360 illustrations. Price 25c per copy postpaid.

IN TIME OF WAR, the man behind the machine is just as important as the man behind the gun. Back of the production lines of every war industry is our first line of defense—the toolroom. Here, where precision is of the utmost importance—where tolerances are reckoned in split thousandths—you will find South Bend Lathes. Modern in design, built with extreme precision, South Bend Lathes are fast and accurate on the most exacting classes of toolroom work. Their wide range of spindle speeds permits machining with maximum cutting tool efficiency. Their versatility facilitates quick change-over through a minimum of set-up time.

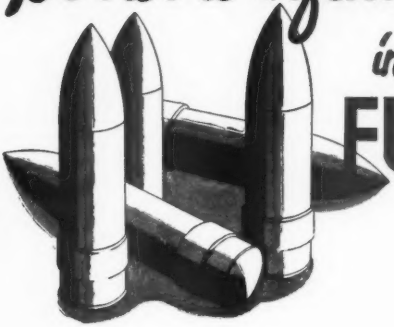
South Bend Lathes are made in five sizes—9″, 10″, 13″, 14½″ and 16″ swings, with toolroom or manufacturing equipment. We also manufacture turret lathes for production operations. Write for a catalog and the name of our nearest dealer.

SOUTH BEND LATHE WORKS

DEPT. 197, SOUTH BEND, IND. LATHE BUILDERS FOR 35 YEARS

AMERICAN

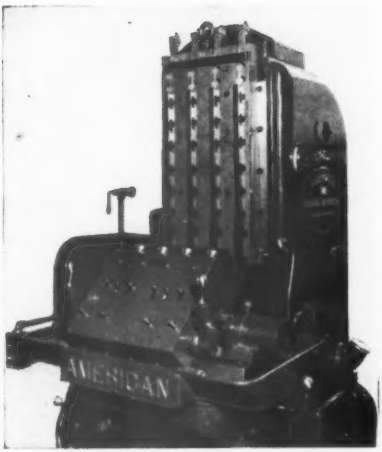
Points to defense



in BROACHING FUSE PARTS

War production of shells has been increased by the use of "AMERICAN" broaching equipment.

The photograph at the right shows the operation on an "AMERICAN" T-6-32 three-way type vertical hydraulic broaching machine arranged for surface broaching end and slot on magazine fuse cap. The material of the part is bronze and four parts are broached simultaneously. A tilting air-actuated work table facilitates loading of parts while machine is making return stroke.



AMERICAN BROACH & MACHINE COMPANY
ANN ARBOR, MICHIGAN, U. S. A.
BROACHING MACHINES, PRESSES, BROACHING TOOLS, SPECIAL MACHINERY

Division of

SKILSAW TOOLS

give production the SPEED that leads to VICTORY!

• SKILSAW DRILLS—23 Models. For fastest production drilling. Capacities from ¼ in. to 7/8 in. in steel.

• Minutes were never before so precious . . . and SKILSAW TOOLS never as important as they are today. Look into Americas's busiest war-work plants and you'll find SKILSAW TOOLS at the front in the battle of production—packing more work into every hour, cutting days from schedules, speeding the flow of vital goods that are needed for Victory! • Are there jobs in your plant that should be done sooner? Your distributor will gladly demonstrate how SKILSAW TOOLS can help.

SKILSAW, INC.
5061 Elston Ave., Chicago

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Philadelphia • Cleveland
Detroit • Indianapolis
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Atlanta • New Orleans
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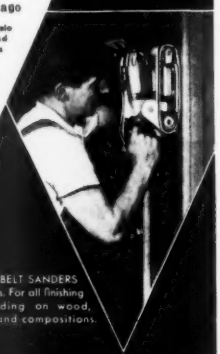
• SKILSAWS—9 Models. Cut metals, wood and compositions in production and warplant construction.



• SKILSAW BELT SANDERS—4 Models. For all finishing and sanding on wood, metals and compositions.

• SKILSAW DISC SANDERS—6 Models. Grind, file, sand and polish on all flat or curved surfaces.

SKILSAW PORTABLE ELECTRIC TOOLS

★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★

Two Handy Nortons for the Tool Room

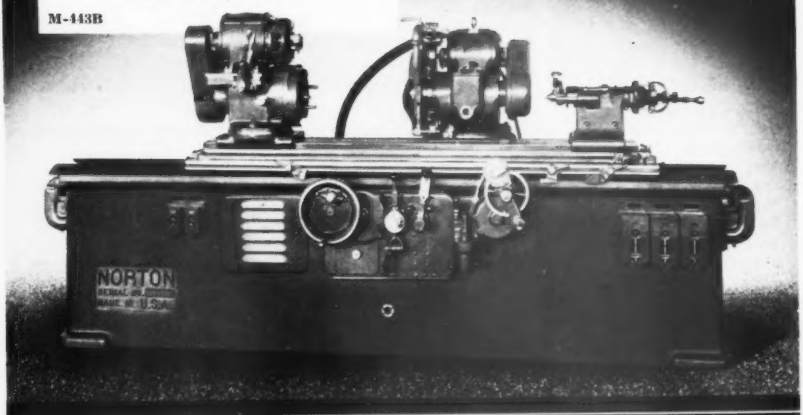
No. 2 Cutter & Tool Grinder with dual controls so it can be operated from the front or either side. Available with minimum equipment or a wide and complete assortment of useful attachments.

Type C. Multipurpose (Universal) Grinder with power table traverse. For external or internal cylindrical, face and angular grinding operations. Supplied in 12", 14" or 16" swing and lengths of 36", 48" or 72" between centers.

Catalogs on either or both machines on request—no obligation.

NORTON COMPANY
WORCESTER, MASS.

M-443B



NORTON
GRINDING MACHINES

TOP QUALITY

. . . means Greater Efficiency

THREAD GRINDER

CLUSTER TYPE

SINGLE MOUNT

★ Christensen has always stressed quality in the selection of diamonds. Our policy insures the maximum service from each diamond tool and saves your valuable machine time for essential production. The finest of Brazilian and African diamonds are selected for shapes and sizes best suited for your diamond tool requirements.

Diamonds selected are mounted by Christensen's Brostite Process into a permanent matrix of powdered metal alloy.

Standard types of tools are carried in stock for immediate delivery. Send your diamonds to us for resetting in our new Brostite mounting. We will ship them within 24 hours.

To assist you in selecting diamond tools for performance and economy, Christensen offers, without obligation, the services of their qualified engineers.

★*Send for our new illustrated folder which gives you full information about industrial Diamonds. Wire or write today!*

Christensen Diamond Tool Co.

3688 EAST WILLIS . . . DETROIT, MICH.

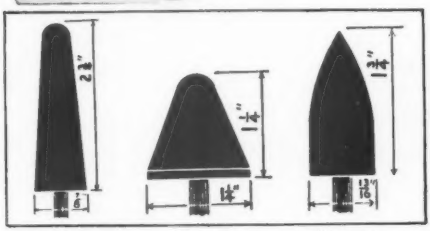
GRINDING THE WAY TO VICTORY

CHICAGO MOUNTED WHEELS

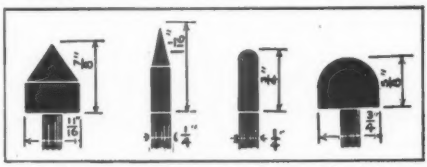
● Speed and Smoothness in cutting action — Longer Life— that's what you get when you use Chicago Mounted Wheels.

Made in all types of abrasives, grains and grades, mounted on shanks of different diameters and lengths — there is a Chicago Mounted Wheel to lick every grinding job from the most intricate cartridge dies to snagging hard-to-reach parts on tanks. For high-speed POLISHING, the sensational new Chicago Soft Rubber Mounted Wheels save hours of tedious hand work.

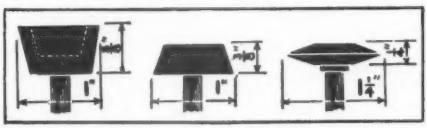
Illustrated is a group of wheels mounted on ¼" diameter shanks, for use with portable and precision equipment. These are one-half actual size. Hundreds of other shapes are available on 3/32", ⅛" and 3/16" diameter mandrels.



No. A-3 *No. A-4 *No. A-11



*No. A-14 No. A-15 No. A-24 *No. A-22



No. A-32 No. A-35 No. A-37

*This shape also available in Soft Rubber Polishing Bond.

TRY ONE FREE

That's the quick way to learn first-hand about these remarkable wheels. Tell us the kind of job, size and wheel speed you use and we'll send a test wheel postpaid.

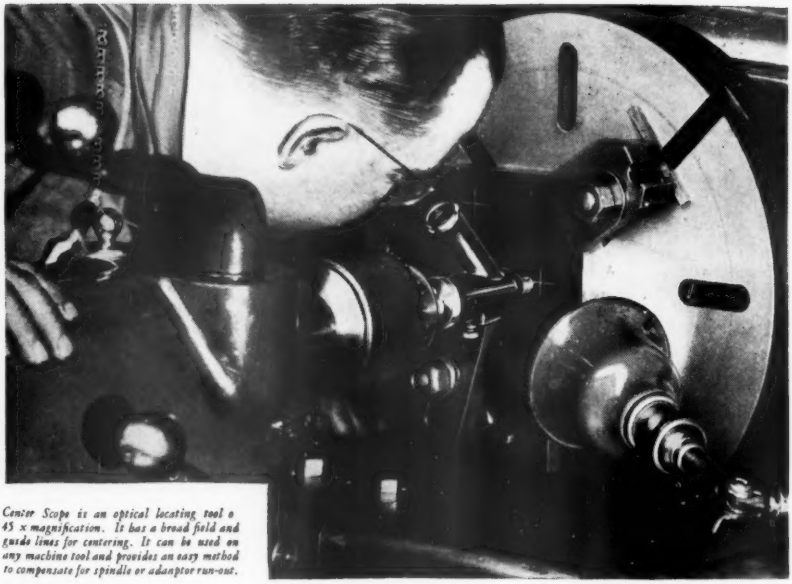
CATALOG

Covers the complete line of Chicago Mounted Wheels and time-saving accessories for use with portable tools. Send for copy today.

CHICAGO WHEEL & MFG. CO.

Makers of Quality Products for 40 Years

1101 W. Monroe St., Dept. TD, Chicago, Ill.



Center Scope is an optical locating tool o 45 x magnification. It has a broad field and guide lines for centering. It can be used on any machine tool and provides an easy method to compensate for spindle or adaptor run-out.

"LOCATING" REVOLUTIONIZED WITH CENTER SCOPE . . . .

Machine tool men everywhere are acclaiming the new Center Scope—the "locating tool" which "speeds up" production, cuts the *error factor* to the bone, and gives accuracy to the "tenth."

Center Scope will locate edges or layouts to the spindle axis, even "within a tenth." It is *fast* to use, and the operator can *see* that he is right.

With Center Scope—accuracy becomes a habit *regardless of who uses it!* It is not affected by wear, temperature or mechanical pressure.

Center Scope has many advantages of which price is vitally important. You can get your Variable Center Scope for only $97.00, f.o.b. Los Angeles, California. The Edge Block is $23.00 additional. Orders are filled promptly.

Call your Kearney & Trecker Dealer or write for Bulletin No. 201C.

Center Scope Department
KEARNEY & TRECKER
Corporation
MILWAUKEE · WISCONSIN

KEARNEY & TRECKER CORPORATION
Milwaukee
MILLING MACHINES

The TOOL & DIE Journal

JUNE, 1942 Vol. 8, No. 3

Letter from Washington

By George J. Huebner

Still More Production for Supremacy

FOR the second successive month as we write our letter from the Nation's capital, cheering reports of an American victory are coming from the Pacific war area. On this day, exactly six months after Pearl Harbor, it looks as though this may be one of the severest "beatings" we have ever inflicted upon an enemy nation.

Our boys were on the alert, ready and waiting. And what is more, American Industry, men and management on the production line, had supplied them with ships, planes, guns and ammunition in sufficient quantities to insure supremacy.

Notwithstanding unpatriotic demands and actions of some during our first six months of war, those workers and employers who stood by their pledges won a victory on the production front which dwarfs any like effort by any other nation.

Out of our war plants, arsenals and shipyards there is flowing day after day a stream of war implements so colossal that we shall soon surpass Axis combined production. Records are being shattered daily. The most striking prediction to date is that in a single plant a new bomber will roll from its assembly line every hour when plant capacity is reached.

It is encouraging to contemplate the increased striking power which such quantities of equipment will give the Allied Nations but we will do well to temper our enthusiasm with the realization that the first six months of war have seen Japan chalk up one victory after another almost as her fighting forces willed. True, there have been a few exceptions of which the Battle of Midway is one, but at this writing it behooves us to renew our pledges to continue the step-up in tooling and production of every part and product that is needed in the war effort.

The Japs and the Nazis, with stock piles accumulated during many years, still have plenty of destructive power. We can nullify it only by developing sheer overpowering striking force with still greater quantities of every kind of American armament ready at every point of enemy contact.

American Industry can do it.

BETTER GAGE DESIGN SAVES MAN-HOURS

By **I. A. HUNT,**
Federal Products Corporation

THE necessity for the utmost care in the design of gages for accurate dimensional control of machined work pieces should be obvious to everyone whose job it is to produce interchangeable parts in quantities. But like too many obvious facts, we may be blind to the value of this one because of persistence in habitual procedures.

It is obvious also that conservation of man-hours is of paramount importance in building an efficient mechanical army, navy and air force in the shortest possible time. Tremendous strides have been made in the design of automatic machine tools which perform several operations simultaneously and today turn out finished perfectly interchangeable parts from rough pieces in a fraction of the time required heretofore. Pre-fabrication of large and small units and cleverly organized assembly lines get the thousands of working parts together in a minimum of time.

But, there are still more man-hours to be saved in controlling the sizes of all these thousands of parts by faster and more positive inspection. If a machine operator or inspector can tell positively when a work piece is within dimensional specifications in fifteen seconds instead of thirty, he is saving a tremendous number of man-hours just as surely, though perhaps not so dramatically, as a machine that hogs off metal in a dozen places at once in a cloud of chips and smoke.

Fig. 1

If an inspector can quickly determine which pieces of work are finished oversize, and *how much* oversize, he can save valuable man-hours in sorting the work and having it refinished. He then saves not only metal which would be scrapped, but also the man-hours required to remelt, cast or roll the raw material ready for machining again.

Man's first device to control sizes was a fixed or single integral master of the specified dimensions with which the like dimensions of all similar work pieces could be compared. But such a gage had two shortcomings which increased as precision requirements became more demanding. The first was its dependence upon human skill in making the comparison and the second was the impossibility of determining the degree of dimensional variance from the master.

Gages which enabled one *to see* rather than *feel* the comparison later came into

use and not only made greater accuracy practical, but speeded up the control of accuracy. Imagine trying to determine positively whether there is only one thickness of primer foil or more than one with any other than an indicating or visual type of gage, Fig. 1. In this particular gage the human influence is reduced to the minimum. The pressure on the foil has been reduced by counterbalancing the weight of the lifting lever, anvil and spindle by the weight. The operator cannot exert any personal pressure on the foil and so vary his reading.

Compare Figs. 2 and 3. In the former, an inspector must hesitate a bit while he feels the work piece slip by the go contact, and then feels it meet the not-go contact. Human skill, true enough, can develop to a point where this sense of touch is amazingly fast and accurate, but it takes man-hours to develop this degree of skill. In Fig. 3 any variation in the work piece size is immediately seen in the dial and the amount of its variation is actually known. Pieces that are out of size can be sorted into groups to be used with other mating parts which are equally out of size and other oversized parts are saved for remachining. The gage in Fig. 3 is also capable of handling any size work piece within its range of adjustment (one inch in this case) whereas the fixed type of gage becomes absolutely useless the instant the dimension under inspection is changed.

An excellent illustration of how man-hours can be saved is shown in Figs. 4 and 5. This applies especially to the construction of the gage and to its efficiency. Fig. 4 shows the original gage and Fig. 5 as redesigned. The former design required a specially turned-out post which, after all, provides a limited adjustment for the indicator bracket. The bracket itself is specially designed rather than one of a standard type regularly furnished on indicators. In Fig. 5, a standard post, adjustable arm, and indicator bracket are used. The base is a standard casting, whereas in Fig. 4, the base is machined out of solid bar steel. The saving in man-hour requirements between the two gages is no small matter.

As to the efficiency in the use of the two gages, the difference is equally great. The anvil of the gage in Fig. 4 is supported in a foot-piece which pivots about the screw. The fit between the pivot screw and the footpiece is .003". Although the top of the gage base upon which the footpiece slides is ground and lapped, the play in the pivot allows the anvil to vary. Unless the inspector is careful, he can exert considerable leverage on the pivot and consequently not obtain an accurate reading. Moreover, as the base wears from continual sliding back and forth, it does not wear uniformly and has to be refinished.

The gage in Fig. 5, however, has a more positive sliding footpiece to support the anvil. The latter has less tendency to vary due to excessive leverage caused by carelessness on the part of the inspector. All too often gage designers and inspectors forget that accuracy depends upon positive and rigid construction as well as an accurate indicator. Many of the latter have been wrongly condemned when the inaccuracy was caused by play in the anvil or insufficient rigidity in the supporting members.

When this country really began tooling for war, gages were wanted for

Fig. 2

Fig. 3

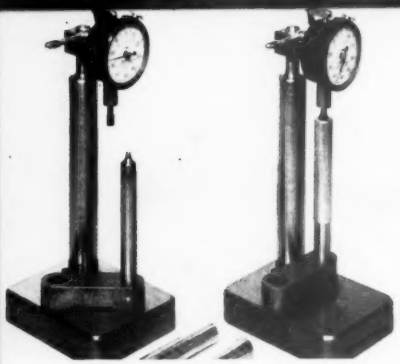


Fig. 4

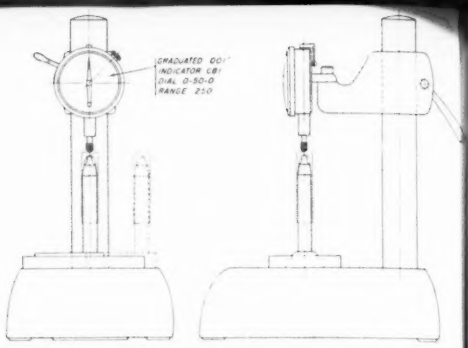


Fig. 5

checking the concentricity and diameter of several diameters of a shell simultaneously. Fig. 6 shows one of the first gages improvised for the purpose. While this will check the concentricity of several diameters simultaneously, it does not check them for accuracy of diameter. It is awkward to use and the indicator contacts are entirely unprotected from careless handling of the shell. Many men had an idea that such a gage would check for accuracy of diameter as well as concentricity because they were quite used to placing a single diameter work piece in a comparator and checking it for diameter, out-of-round and taper. This is impossible when checking several diameters on the same piece unless all diameters are absolutely concentric with each other. Since such a condition is most impractical the gage must be designed so that each diameter is checked independently of the others.

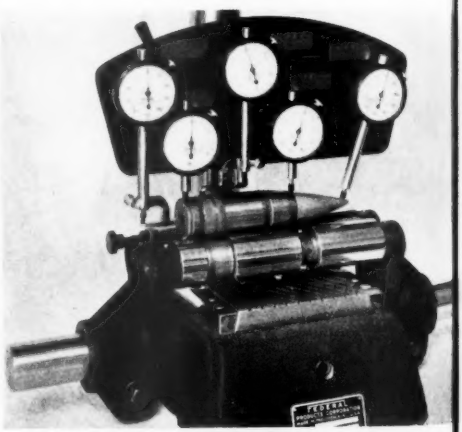
In Fig. 7 a fast and accurate gage is shown for checking shell for the concentricity of several diameters simultaneously. Note that each indicator contact is protected from damage by the block placed beside each contact. Each contact itself is free to float in making its contact with the shell, hence there is no side thrust which can cause friction or otherwise affect the accuracy of the shell.

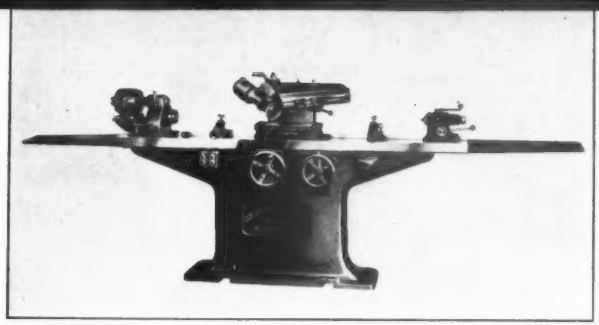
The two indicators at the left are drawn back while the shell is placed in position on the V-block and then pushed back into the tracer cavity and the concentricity of the inside diameters checked. The middle indicator in the lower row which inspects the crimping groove also moves sidewise to adjust for position. This is only one design of many, for each different type of shell requires its own arrangement of indicators. As stated before, diameters are inspected on a still different type of gage.

Multiple inspection gages have, of course, been in use for some time, but gage designers too often think this requires elaborate and *completely automatic* types. They miss the fact that

(Continued on Page 74)

Figs. 6 and 7





Longer Life from Broaches

by
Harry Gotberg, Chief Eng.
Colonial Broach Company

METHODS recently developed to prolong the life of broaches take on new importance due to so many critical tool shortages in war production industries. The service life of broaches has a direct effect upon not only the cost per piece, but more important—the speed with which needed parts and equipment can be produced.

Longer service life from broaches involves two factors—proper sharpening and proper storage and handling.

Since broaches are generally made from hardened high speed steel and may be equipped with sections of tungsten carbide, the cutting edges of the teeth will easily chip or become nicked if the broach is dropped on a hard surface or carelessly handled. Individual storage pockets or bins, lined with a protective material, will prevent the cutting edges of the teeth from damage.

The cutting edges of a re-sharpened broach should equal the cutting edge of the initial broach formed at the broach maker's plant. Reproduction of original quality in a re-sharpened broach necessitates the use of special equipment developed for this purpose. Makeshift equipment cannot be expected to produce the accuracy and finish obtained with special broach sharpening machines. Illustrated is the new Colonial Universal Broach Sharpener which may be used for sharpening either flat or round type broaches.

Satisfactory broach performance and service life can be obtained only if the cutting edges are maintained as originally designed. Excessive departure from the original size and form of the teeth often produces a groove below the proper curvature of the tooth form, thus creating a "pocket" which prevents the chip from clearing the point of the tooth. Robbing the teeth of full chip clearance may cause the broach to break. This is especially true in broaching steel parts where a continuous chip is produced.

Often damaged broaches can be salvaged from sections which have one or two broken teeth or when a section has been re-sharpened to a point where the width of the teeth will not allow additional sharpening. Extreme care is required for this work so it usually is returned to the broach maker to be brought back to its initial condition at nominal expense.

A number of Hook and Radius Gages suitable for checking the correct radii at the bottom of the tooth form and the correct hook angle are available. Gages of this kind are virtually necessary in maintaining broaches at peak efficiency and are a material aid in preventing damage from improper sharpening.

Typical Designs for Drilling Jigs and Fixtures

Part VI*

By C. W. Hinman
Designing Engineer

MANY types of work fastenings used in drilling jigs and milling fixtures are closely allied. The same general design of locking devices are frequently used in both these tools. It is, therefore, well to consider some of the principles of drill jig fastenings and attachments and show how they gradually merge into the common types of fastenings used in milling fixtures. It is best to make this comparison now, before taking up the subject of milling.

Single and Compound Equalizers

Fig. 9 shows a single equalizer bar mounted on the leaf of a drill jig. It clamps the work firmly at both ends regardless of unequal thicknesses. Clamping occurs when the wing nut is tightened and raises the leaf. Fig. 10 shows the principle of compound equalization. Here, two pieces of work are clamped at both ends regardless of unequal thicknesses. Equalization in clamping multiple parts can be accomplished by still further compounding the equalizers. However, clamping more than four pieces in this manner is seldom done because multiple drilling of separate parts is often uneconomical and the mechanical complications are undesirable.

Fastening the Leaf

It is very necessary that drill jig leaves be clamped and unclamped quickly. Fig. 11 shows the conventional type of leaf bolt used in many plants. The leaf is made with a slot slightly wider than the width of the bolt head. In operation, the bolt head is turned so that the leaf will pass over it when lowered. The bolt is then tightened a quarter turn so that it seats against the upper face of the leaf.

Another common form of jig leaf fastening is illustrated in Fig. 12. This type consists of of an eyebolt and a scalloped hand knob. The knob is swung out of the way (as indicated by dotted position) when the leaf is to be opened or closed. Clamping action is obtained by moving the eyebolt into a vertical position and tightening with the hand knob to suit.

A leaf lock consisting of a cam latch is seen in Fig. 13. In this design the cam is carried in the leaf and is locked by swinging it downward so that the opening machined in the latch engages under the pin located in the jig wall. The hook is curved to obtain cam action and the leaf is held securely when the cam handle is pushed downward. In opening the leaf the handle is raised. This action unlocks and lifts the leaf all in one motion.

Of the many types of automatic leaf locks the one shown in Fig. 14 is used extensively. The latch hook is pivoted in the body of the jig and is provided with a coiled spring to keep it in a locked position. In closing, a slot milled in the leaf passes over the latch and the bottom of the slot forces the latch outward until the leaf is properly seated. The

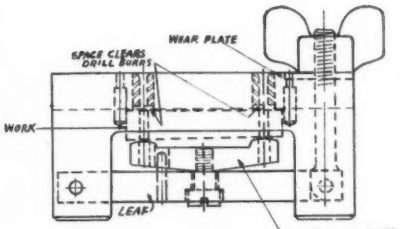


FIG. 9

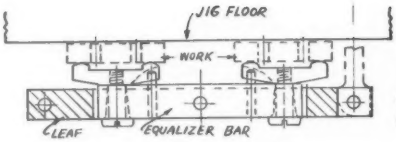


FIG.-10

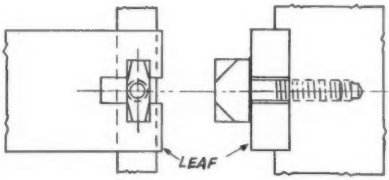


FIG. 11

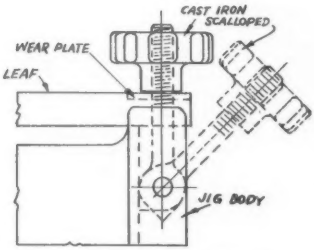


FIG. 12

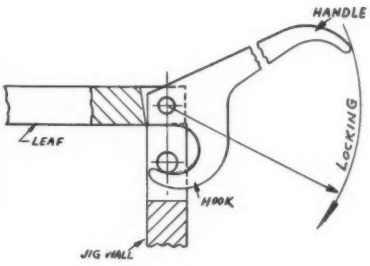


FIG. 13

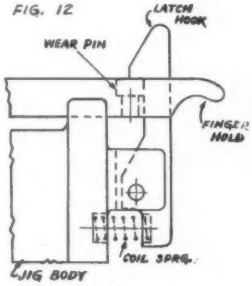


FIG. 14

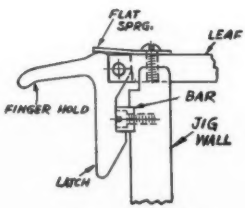


FIG. 15

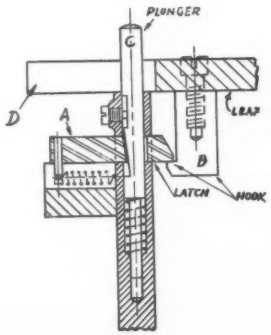


FIG. 16

compression spring then forces the jaw on the latch to "catch" over the leaf and hold it. A pin located under the latch jaw takes up wear. This is really a quick action lock. When the leaf must be opened, the operator places his forefinger under the finger hold, opens the latch with his thumb and then raises the leaf. This can be done in one movement.

Another quick action lock is shown in Fig. 15. Here the latch is also carried in the leaf and locking is obtained under the hardened bar shown in the cut. A flat spring attached on the leaf forces the latch to hold its locked position. To open the leaf, merely raise the latch handle under the finger hold. This action automatically releases the jaw under the bar and permits the leaf to be thrown back for unloading and loading the jig. In all cases wear is compensated for by "shimming up" pins or by reversing the position of the bar. Sometimes it is necessary to substitute new pins or bars.

A self-locking leaf latch is shown in Fig. 16. The jig body is provided with a sliding plate *A* which is the locking member. Hook *B* is positively attached on the leaf. This design permits a satisfactory locking position when plate *A* slides over hook *B*. A coiled tension spring holds *A* and *B* in locked positions. To release the lock, plunger *C* is depressed which carries an angular face on its side for moving plate *A* from hook *B*. The leaf is then free and can be opened by using its handle *D*.

Fig. 17 is a sectional view through a cast semi-steel jig leaf as commonly used in designing large drilling jigs. Ribs of generous sizes should always be used to protect such leaves for accuracy and to insure long life with hard usage.

Hinges for Drilling Jigs

Drill jig hinge pins can be made in a variety of designs. In Fig. 18 is shown a tapered pin used as a hinge. Such pins are more economical to use than a straight pin. The tapered pin can be driven farther in to compensate for wear after long use of the jig.

Fig. 19 shows a straight pin used in connection with hardened washers and bushings. The pin is a press-fit in the jig body and a slip-fit in the leaf bearings. When the hinge wears a larger pin should be used and the washers replaced with new ones.

In large jigs it is often necessary to provide a grease cup or Alemite connection to lubricate the hinge pin. Fig. 20 shows how an Alemite connection is used. A center hole is drilled along the length of pin but is not drilled entirely through the pin. Outlet holes within the bearing bushings distribute the lubrication when the "gun" is used on the valve stem connection.

Fig. 21 shows a leaf stop riveted on the end of a jig body. This prevents the leaf from swinging too far when opened and considerably speeds the operation of the tool.

Clamps and Centralizers for Drilling or Milling

Fig. 22 shows round work centralized in a V-block clamped for either drilling or milling.

Fig. 23 is a V-block design often used when side pressure is applied for holding the piece against drilling or milling thrusts. Angle *E* is usually made between 10° and 20° depending upon the size and working conditions.

It is often necessary to force rounded work into V-block for centralizing and holding. This principle is sketched in Fig. 24. In Fig. 25 a less expensive method is shown in which pins are used to shape the V-block. Fig. 26 is another V-block designed by using pins. In this case the pins can be adjusted as to length and then locked with jam screws.

Fig. 27 represents a V-block that is guided in a channel. It forces rounded ends of work to be centralized and clamped when the hand knob at the left is screwed in.

A moving pair of centralizing and clamping jaws are illustrated in Fig. 28. When the wing nut is turned clock-wise it advances an attached cone which separates the right ends of the clamps and causes them to grasp the work between V-blocks in their left ends. With this device round work of varying diameters can be centralized, positioned and clamped.

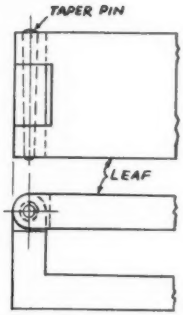


FIG. 18

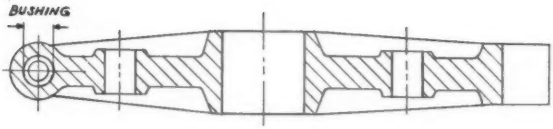


FIG. 17

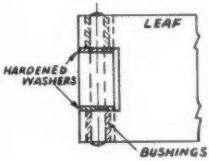


FIG. 19

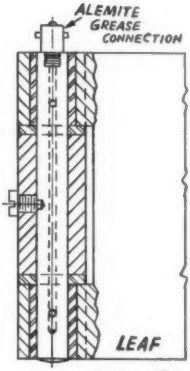


FIG. 20

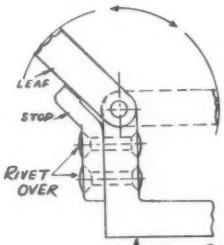


FIG. 21

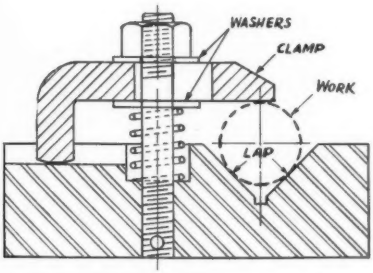


FIG. 22

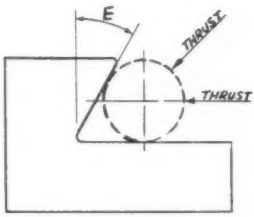


FIG. 23

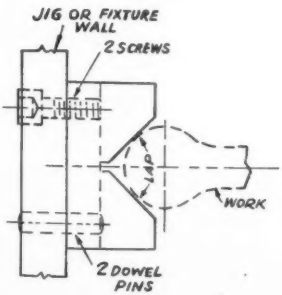


FIG. 24

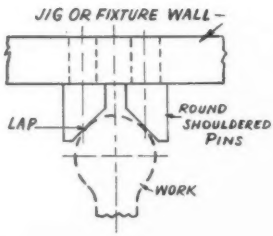


FIG. 25

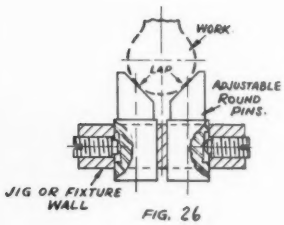


FIG. 26

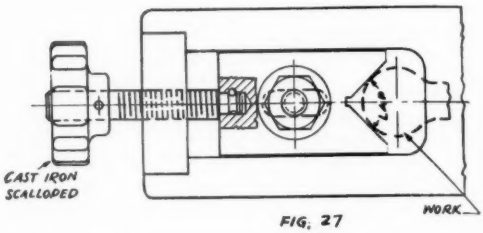


FIG. 27

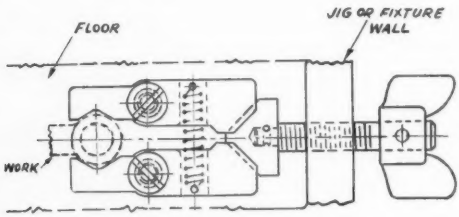


FIG. 28

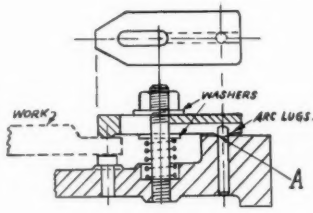


FIG. 29

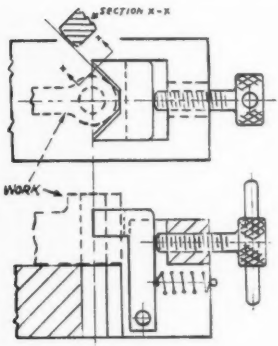


FIG. 30

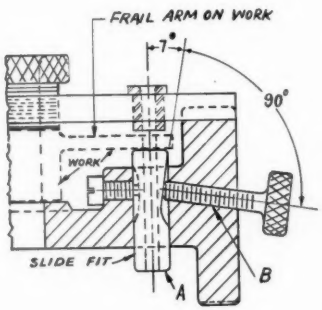


FIG. 31

Fig. 29 shows a sliding clamp used for rigidly holding pieces of work for either drilling or milling. The clamp can be released by backing up the nut and removed by sliding back from the work.

A hinged angle, one leg of which is a V-block, is an effective centralizing and clamping unit. This type, illustrated in Fig. 30, is popular because it is simple, easy to make and operate.

"The Touch-Pin Principle"

This is a good way to support a frail projection on cast work after the main body of the work has been previously registered and clamped in the tool. The idea is used for both drilling and milling and is presented in Fig. 31. The operator advances pin *A* with his fingers to an easy contact under the frail projection and then locks it with screw *B*. The projection can then be safely drilled without bending or distortion. The screw point contacts the angular flat on the touch-pin at right angles; this prevents the screw from loosening by machine vibration.

**Practical Designs for Drilling and Milling Tools by G. W. Hinman.*

Thread Grinding with Electrical Control

By Lee M. Davis

Jones & Lamson Machine Tool Company

THE first thread grinding was probably done with an engine lathe on a piece distorted by hardening which necessitated a more accurate job. This, of course, was not production thread grinding but merely a correcting process using a small wheel without coolant and any accurate means of truing the wheel to the proper thread form.

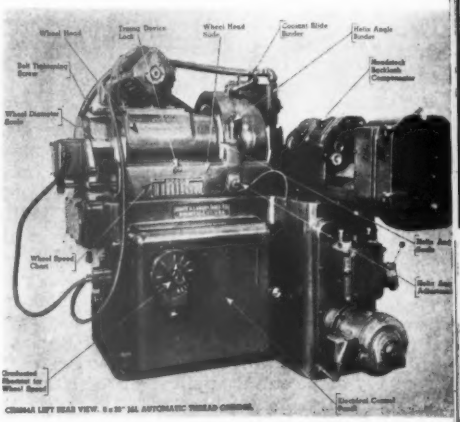
Since then many important things have happened to thread grinding. In 1920 the first hardened and ground taps were made for commercial use. These taps, made better and more accurate tapped holes than had been possible before. It was not until 1935 that a thread grinder was developed for grinding the present variety of work. Modern machines are made very heavy and rugged, weighing about 4 tons. This seems like a lot of machine just to control the point of a wheel, but this weight is necessary to prevent vibration.

With the use of harder materials, grinding becomes the only method that can be used to cut threads. Hardened shafts can be threaded before heat treatment but this causes distortion and damage so that a stoning operation is necessary after hardening.

A typical thread grinding job might be as follows: Grind a 4 pitch Acme thread from the solid in a shaft made of 32-50 material, Rockwell C 50 to 55. Analysis of this job might suggest two-way grinding in several cuts with wheel truing at one intermediate point and before the finish cut. With the wheel running and the machine loaded, pressing of the cycle start button is all that is required of the operator. The work slide will travel between predetermined limits, pausing at each end of travel for 180° of rotation of the cam drum. The cam drum in its travel first throws the drive into neutral; then produces a truing feed, if called for by the setup; reverses the work head drive; produces a wheel feed and finally engages the driving clutch. These functions of the cam drum run without interruption if truing is not called for by the original mechanical setup of the machine. If, however, an intermediate truing operation is called for, the truing feed motion, through electrical control, stops the cam drum and holds it stationary until the truing diamonds have passed over the wheel. A limit switch in the truing device restarts the cam drum for the balance of 180° of movement.

This action repeats until the last grinding cut is made. When the wheel is fed for this last cut, the feed mechanism engages a limit switch which causes the movement of the cam drum, following the last cut, to be stopped at neutral for reloading of the machine. Thus a fully automatic machine cycle is obtained with truing as required and with size control.

The Jones & Lamson thread grinder is an excellent example of the important part the electrical engineer can play in the design of a machine requiring accurate control of a sequence of operations.



The Use of Silver Alloys in Brazing

By A. M. Setapen
Development Engineer
Handy & Harman

NOBILITY, if the term be construed as meaning too good for common usage, may be a handicap. When the term is applied to a metal, even though it is intended to denote ability to resist corrosion, it may result in setting such a metal as silver apart, as too good for wide use in industry. This has been somewhat of a handicap to the use of silver in industry partly because the engineer or production man unthinkingly regards silver as a luxury rather than as a metal which has many practical industrial uses.

Saving Tungsten by Using Silver

This erroneous idea is unfortunate as today more than ever before tungsten, high speed tool steel and other critical metals are being conserved by brazing cemented carbide tool tips with silver brazing alloys. The use of a brazing medium having a low melting point reduces the danger of overheating the tool tips and enables the operator to braze in less time.

Not only are silver alloys helping to conserve vital metals needed for war production but they are also aiding in the reclamation of costly cutting tools. Many manufacturers have salvaged irreplaceable cutting tools by brazing with this low temperature alloy. A joint less than .003" thick is required, hence, little silver is needed and the cost is slight. The same is true in millions of joints brazed with silver alloys or made with silver solders. Silver is serving scores of war production plants and is destined to still wider use in the opinion of the American Silver Producers Research Project, which under Handy & Harman direction, is investigating a great variety of potential applications of silver in industry.

The Need for Low Temperature Brazing

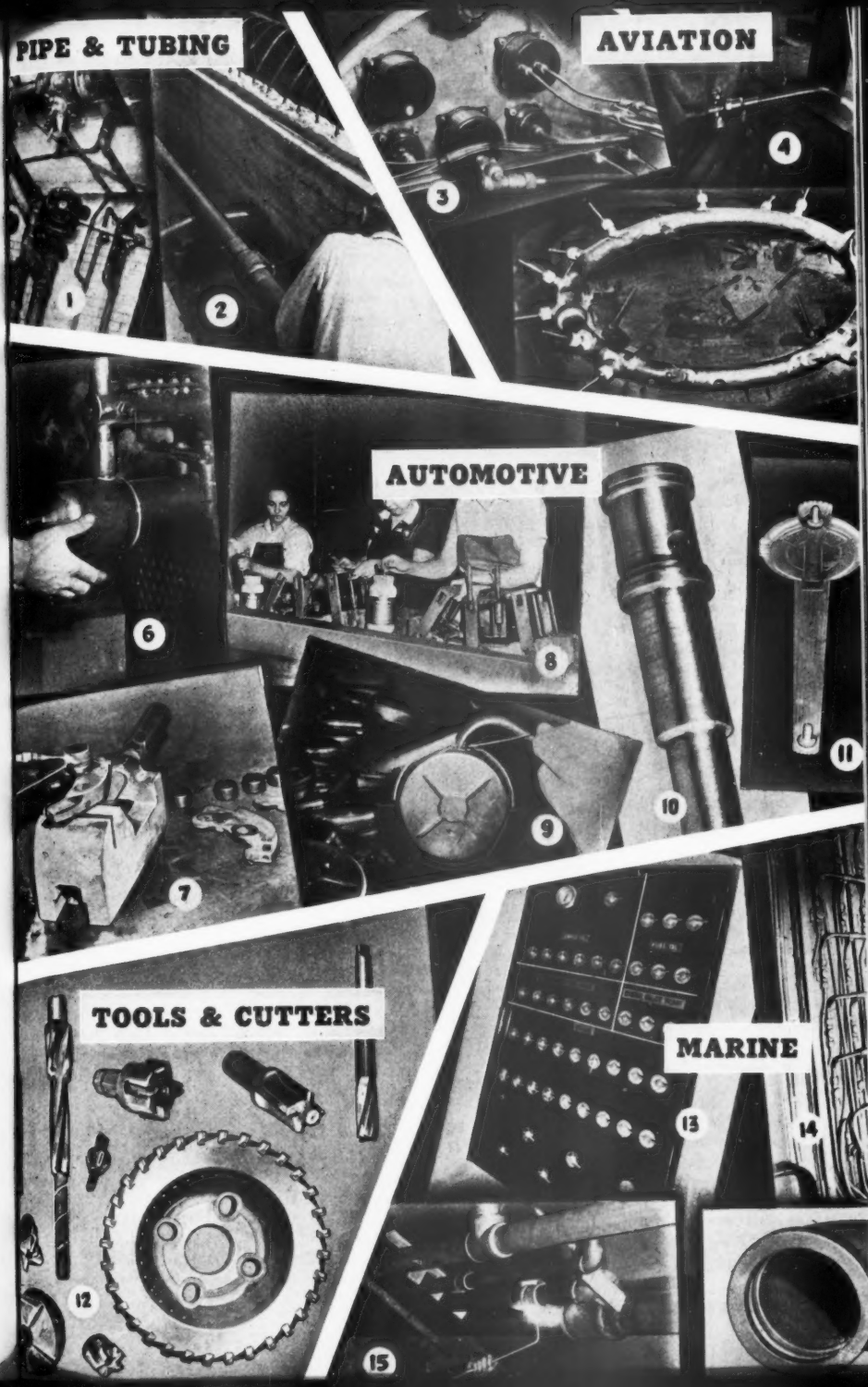
Starting from a few special applications less than a decade ago, the use of silver brazing alloys expanded with unusual rapidity because they fill three primary manufacturing needs. They make strong, durable joints at low temperature—their fast brazing action speeds up production—and the cost is surprisingly low. They have replaced soft soldering, high temperature brazing or welding, riveting, bolting and clamping for many purposes. In normal times tons of these alloys are used annually in the manufacture of air conditioning, refrigeration and electrical equipment. Today in addition to brazing tools and cutters they are being used 100% for war production including many operations on shell, tanks, trucks, guns, ships and ammunition.

Quality and Economy in Metal Joining

Low working temperature of silver brazing alloys between 1175° and 1600° F make it easy to raise work rapidly to brazing heat. This results in faster production, saves time and lowers heating cost. Low temperature also safeguards the physical properties of metal which high heat might damage or destroy.

Exceptional fluidity gives them the ability to penetrate into a joint instantly. Joints are as strong as solid metal, gas tight and unaffected by shock, vibration and temperature changes.

The amount of low temperature silver brazing alloy needed to make a joint is far less than the amount of alloy required by high temperature brazing or welding. The alloy penetrates into the joint and little or none is left outside.


PIPE & TUBING
AVIATION
AUTOMOTIVE
TOOLS & CUTTERS
MARINE
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Brazing Strength and Tolerances

Silver brazing alloys in themselves are strong, having tensile strength of from 40,000 to 60,000 psi. When this film penetrates into a joint and bonds with metals, however, they have the unique ability to hold far beyond their original strength.

Metals to be joined should fit close enough to permit the effective working of capillary action. From experience in the laboratory and field, it has been found that clearances of from .001" to .003" on flat or tubular work give the strongest and soundest joints. Clearances which are too close cause bare spots where brazing alloys are unable to flow. Enough clearance should be allowed to make certain that there will be a film of brazing alloy throughout the joint.

Economy with Silver Brazing Alloy

Second only to strength and reliability are the economies silver brazing alloys made possible. Fast application, less materials and gases, an unusually small amount of alloy per joint, low finishing costs and far fewer rejects make them, for a great many purposes, the most economical metal joining medium.

A true picture of costs cannot be gained by comparing the cost of brazing alloys per pound or ounce. The only accurate basis is to compute the cost per joint.

Importance of Proper Design

Proper design is mainly a question of the type of joint to use and the tolerance required. Three types of joints are in general use—butt, scarf and lap or shear. The lap or shear type of joint is the design generally recommended, although the others can be used satisfactorily under some conditions.

Butt Joints

There are some applications where the double thickness of a lap or shear type joint is undesirable. Here properly made butt joints can be used with good results, provided a few precautions are taken. The surface to be joined should be cut or machined square. This provides the close clearance required to make joints of maximum strength.

Scarf Joints

This is a special form of butt joint. The surfaces to be joined are at angles of less than ninety degrees to another surface of the parts to be joined. This type of joint is widely used for such work as joining band saws and making large sizes of copper pipe and provides high strength without making joint thickness greater than that of the metals joined. Joints are held in place by clamping while brazing.

Shear Type Joints

These are most generally used as any desired factor of safety can be incorporated by varying the lap shear area. This type of joint also offers better resistance to corrosion, due to the small area of brazing alloy exposed. In joining flat parts a little pressure insures complete bonding.

Importance of Proper Cleaning

A common cause of trouble in brazing with silver alloys is poorly cleaned metal surfaces. Surfaces to be joined must be clean and all dirt, grease, oil and oxides removed. Cleaning can be done by mechanical or chemical methods. Usually emery cloth or similar abrasives effectively remove oxides and dirt. A fine file or grit blasting is also effective. Any mechanical cleaning method that leaves a deposit of oil should be followed by a wash with a good grease solvent.

Proper Fluxing Necessary

There are, briefly, three functions a flux performs—it protects metals from oxidation while heating—it dissolves any oxides that form—it assists the flow of the brazing alloy. Apply flux to the work with a brush to get an even distribution. Fluxing should be done after cleaning and before heating to a point where oxides are likely to form. The brazing alloy should also be protected from oxidation.

Methods of Heating

There are several methods of heating and the one best suited to the work will depend upon the quantity of work, size of individual units and whether the work is done in the shop or in the field.

(Continued on Page 78)

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QUICK DEMAGNETIZER

Operates on **220 VOLTAGE** A. C. 60 Cycle

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AN outstanding unit needed wherever magnetic chucks are used. Operates on 220 voltage. Any ordinary sized pieces, such as cutters, gears, washers, etc., can be demagnetized by a single pass through its powerful field. Can be easily connected by your own electrician in any convenient location in your plant. Equipped with convenient switch. (If your power is other than 220 volt, 60 cycle, A. C., kindly let us know.) Carried in stock for immediate delivery. 10 DAYS FREE TRIAL IF DESIRED.

Price $120.00

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Makers of High Speed Milling Cutters — Form Tools and Special Tools

20000 WEST EIGHT MILE RD. DETROIT, MICHIGAN

Conservation of Vital Alloys

DURING the past few years many different types of alloy steels have been developed for the manufacture of all kinds of machines and equipment. Many of these steels contain relatively large quantities of nickel, chromium, vanadium, etc. They were developed by research and experience to meet specific requirements. Since most alloying elements were plentiful it was metallurgically sound to create these highly specialized steels to produce maximum physical properties. Because current needs for war production alloy steels are so great, the supply of these various critical alloying elements is entirely inadequate. This problem has forced the development of new steels containing a minimum of alloying elements but of a composition balanced to produce adequate physical properties.

In order to develop "lean" alloy steels all research records were carefully examined. The War Production Board put the best metallurgical brains in the country to work on the problem. The outcome was the creation of a number of analyses now called NE (National Emergency) Steels.

Cooperating with the War Production Board

To make these new alloys quickly available, Joseph T. Ryerson & Son, Inc., Chicago, has planned a representative stock of hot rolled rounds in sizes ranging from ½ to 7 inches in diameter and in six different analyses. Heretofore, these new steels have not been available for experimentation and it has been difficult to secure even small lots necessary for determining the suitability of the steels for an application. Now, manufacturers can get small lots for treating and testing in specific applications. This method will assure proper selection of steels, which can then be ordered confidently in production quantities.

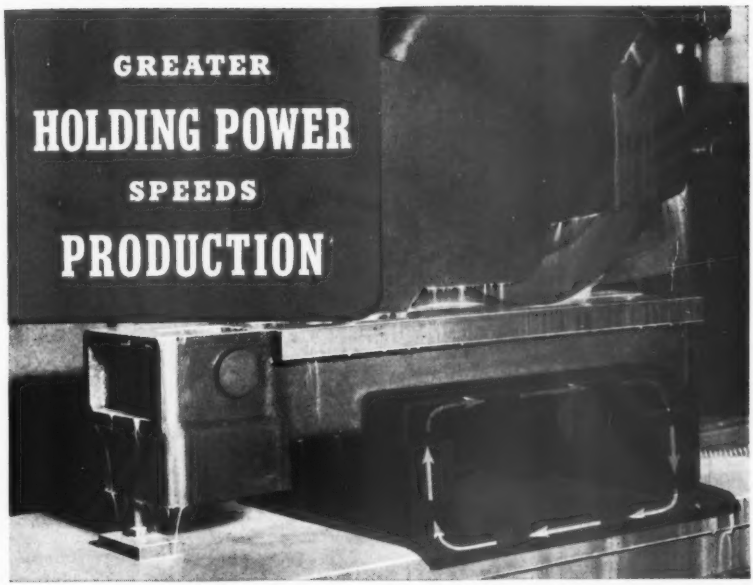
How New Steels Replace High Alloys

Exact distribution among the Ryerson plants is not yet decided, but initial stocks will consist of six analyses: (1) carburizing alloys, NE 4023 and NE 8620; (2) medium hardening alloys, NE 4042 and NE 8744; (3) high hardening alloys, NE 4047 and NE 8749. It is confidently believed that these new alloys, properly selected and heat treated, will satisfactorily replace the higher alloy content steels formerly used . . . . except in very special applications.

Report Results of Substitutes

The Metallurgical Section of the WPB is very anxious to know how the new NE Steels will do the job and conserve scarce metals. Therefore, all users are urgently requested to report details of each operation such as forging—machining—heat treatment response—tool life, as well as the results of tests, etc., so that this information can be made available to others.

Carburizing Grade		*Medium Hardening Grade*		*High Hardening Grade*	
NE (National Emergency) Alloy Steels	Replace AISI & SAE	NE (National Emergency) Alloy Steels	Replace AISI & SAE	NE (National Emergency) Alloy Steels	Replace AISI & SAE
NE 4023 NE 8620	2300 2500 3100 4100 4600 5100 6100	NE 4042 NE 8744	2330-35 3130-35 4130-35 5130-35 6130-35	NE 4047 NE 8749	2300 3100 3200 4100 4600 6100



Powerful "Magnetic Body Flo" (shown in red) securely locks work, chuck and parallel to the working table.

THE ANDERSON & BROWN Magnetic Chuck goes beyond the limitations of the conventional type of magnetic chuck which uses "skin" or surface magnetism. Something new and extremely desirable is revealed in the method of holding work that otherwise could not be held with the old-style magnetic chuck.

"Magnetic Body Flo" is the term applied to the magnetic principle involved in holding work with the ANDERSON & BROWN Magnetic Chuck. The magnetic flux flows through the work, the parallel, and back to the magnetic chuck through the working surface of the grinder, locking and holding all elements tightly together.

The ANDERSON & BROWN Magnetic Chuck has revolutionized magnetic chucking with a different method of holding work. The necessity of special holding devices is greatly reduced. Its adaptability, flexibility and intense holding power eliminate in many cases these special fixtures. Obviously there is a decided saving in time and money.

That you may better appreciate the quick set-ups and other advanced features of this chuck, send for your copy of illustrated circular "Magnetic Chucking Revolutionized."

SEND ME "MAGNETIC CHUCKING REVOLUTIONIZED"

ANDERSON & BROWN CO.
2034 East 22nd Street, Cleveland, Ohio

Name .....
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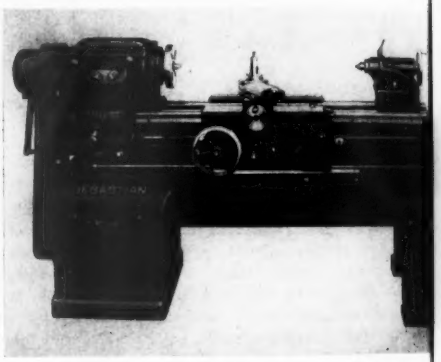
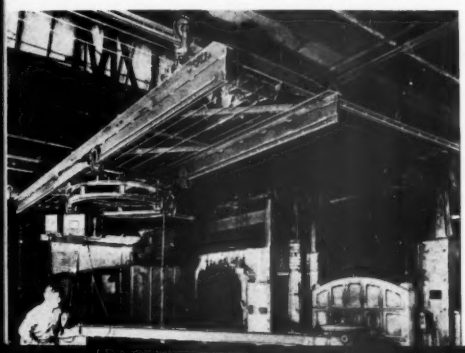
City .....State .....

Progress on Parade

Sebastian Type H Lathes are equipped with Timken Bearings on all shafts in the headstock including the spindle which assures accuracy and 15% to 20% more power. The oversized heat treated and hardened steel gears give the headstock more power and a longer life. The threads are from 3 to 384 giving 72 feed and thread changes with an accuracy of .0005" at every point of alignment. Regular equipment includes motor, reversing switch, chip pan, steady rest, threading dial, depth threading stop, two face plates and wrenches. Manufactured by The Sebastian Lathe Co., Dept. T-6, Cincinnati, O.

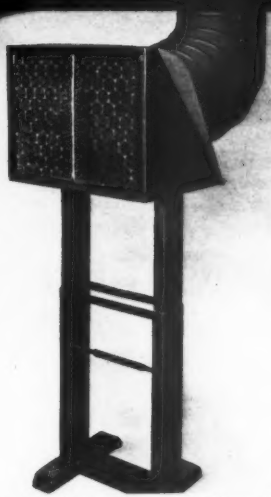




This quenching crane, manufactured by The American MonoRail Co., 13109 Athens Ave., Cleveland, O., solves the problem of moving annealing pots from furnace to quench in the quickest possible time. It serves a compact area containing four or more furnaces set by pairs at right angles facing the quenching machine.

One man operates the crane by hand with a ½-ton electric hoist to raise or lower 900-lb. counterweight which consequently picks up or drops the 400-lb. pot.

Swivel movement, as well as movement across bridge and entire crane on runways, is by hand on trolleys provided with precision bearings.

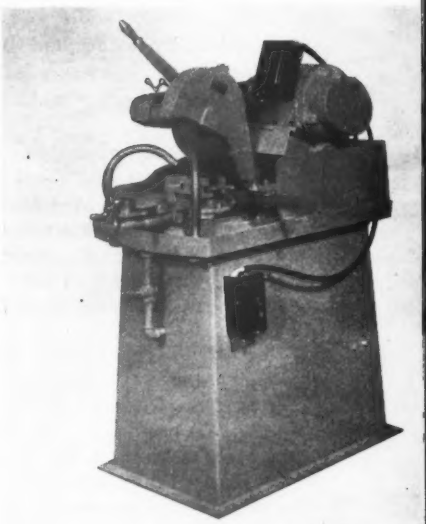


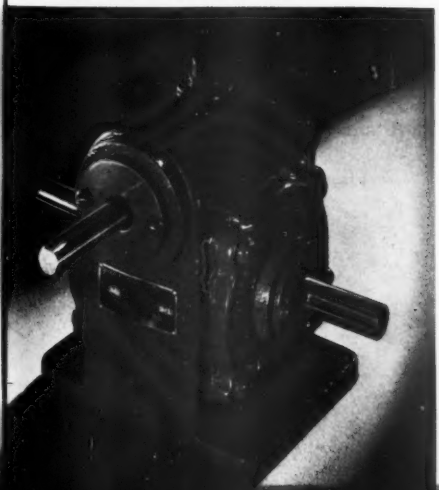
The Radiac Type N Abrasive Wet Cut-Off Machine accurately cuts off bars, tubing and formed shapes. The cut is clean, smooth and seldom requires any additional finishing. Coolant is directed onto the wheel and work at the point of cutting, increasing wheel life, reducing cutting heat and minimizing any tendency to burn.

Sturdy construction of every part of the machine, precision machining and proper balancing of all moving parts eliminate vibration which results in economical operation. Two types of vises may be supplied—a straight vise for straight cuts only, or a swivel vise for straight or angle cuts up to 45°. The manufacturer is A. P. De Sanno & Son, Inc., Dept. TD, Phoenixville, Pa.

The Filtaire, a complete, portable, self-contained dust collector unit has just been announced by Edward Blake Co., 636 Commonwealth Ave., Newton Centre, Mass. The motor and fan are located behind an inexpensive, replaceable Dustop filter made from fireproof spun glass so that all bearings are protected from dust and grit.

The purified air is expelled through a right angle elbow at the back creating an advantageous air circulation overhead. This dust collector is particularly suited for use with grinding and polishing machines where no central dust collecting system is available.





A new worm gear speed reducer was recently announced by Winfield H. Smith, Inc., Springfield, N. Y. The hardened steel worm is keyed to the shaft and mounted on radial thrust type ball bearings. The wheel is made of special alloy bearing bronze. Built-in type oil seals are provided at all shaft extensions. The reducer is 6½" high, weighs 15 lbs. and has a ¼ hp motor. Catalog 141-A will be sent upon request.

PROGRESS

Fig. A

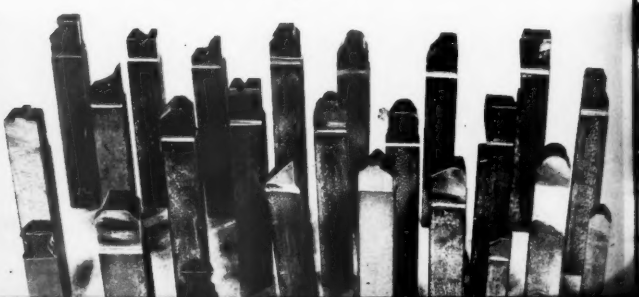
A NEW larger capacity Gray Portable Coolant Pump for automatic applications of coolants to cutting tools is announced by the Gray-Mills Co., 211 W. Ontario St., Chicago, Ill. Features of this Heavy Duty Coolant Pump are portability, controlled flow, baffle plate construction and forced settling fixture, larger tank capacity, ball bearing type motor, flexible power shaft coupling and easy access to all working parts.

BARRELS of paper, fiber, wood or light gage steel can all be handled by the new Ernst Drum and Barrel Carrier. The Ernst Magic Carrier Sales Co., 1454 Jefferson Ave., Buffalo, N. Y., claims barrels from 14" to 24" diameter with 800 pound capacity can be accommodated. Three-wheel construction automatically balances the load. Straight, vertical lift of the barrel from the floor prevents any flowing over of contents from open-head containers.

CARBOLOY CO., INC., 11191 E. 8 Mile Rd., Detroit, Mich., submits this picture to show what a tool engineer can do with some real "Yankee ingenuity". These special carbide cutting tools all started out alike—standard Carboloy tools. He saved his company weeks of time and quite a bit of money by ordering a supply of standard tools and grinding them to over 200 various special shapes needed for chamfering, grooving, forming operations, etc.

Fig. B

Fig. C



...SS ON PARADE

Fig. F

DOING a job of cutting multiple splines in adapters by means of a slotting head attachment is illustrated below. A slotting tool is fastened to the clapper box tool holder and the job is ready for slotting. Use of the slotting head requires no tooling expense and the entire operation is accomplished with one setup. Further details furnished by Experimental Tool & Die Co., 12609 Greiner, Detroit, Mich.

EASY on floors, platforms and loading aprons, this "Truck-Man" has a carrying capacity of 2,000 lbs. and is designed for rapid and efficient movement of loads. The engine can be operated for approximately four hours continuously at three-fourths load on two quarts of gasoline. Grease sealed ball bearings are used on all rotating parts. With the exception of the motor, transmission, drive wheel assembly and hydraulic lift, the truck contains no parts that cannot be reproduced in any tool room. Manufactured by Yard-Man, Inc., Dept. T-6, Jackson, Mich.

FIGHTER and bomber crews cannot live in the rarefied air of the sub-stratosphere without oxygen. Old type oxygen cylinders when hit by a machine gun slug would explode and hurl jagged pieces of steel through the cabin causing more destruction than bullets. Walter Kidde & Co., 126 E. 42 St., New York, N. Y., developed a completely shatterproof oxygen cylinder that would not burst when riddled by .50 caliber armor-piercing bullets.

Fig. D

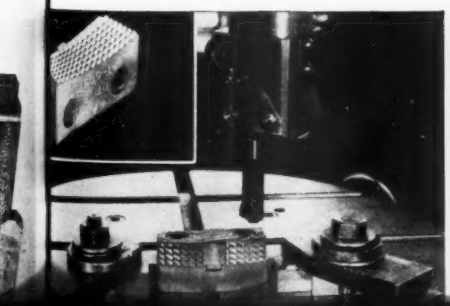
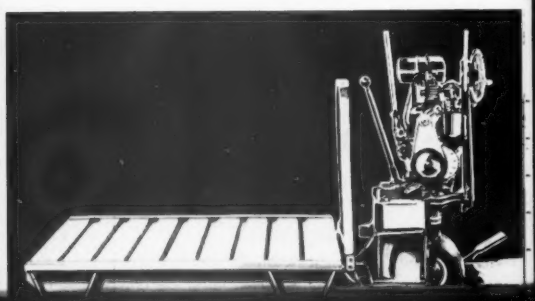


Fig. E



VICTORY DIGEST

PURCHASERS of machine tools must include in their orders to manufacturers specifications or other description in sufficient detail to enable the producer to place the tools in his production schedule, WPB ruled in May.

Some prospective purchasers of machine tools have advised tool builders of their intention to purchase machines of a given type, but the tool is frequently described in such vague terms that it cannot be placed in a production schedule according to the provisions of E-l-b until additional information is furnished.

★ ★ ★

FANCY painting and finishing of metal working machinery by machine tool builders were banned after April 30, the WPB announced. Limitation Order No. L-108, effective April 27, provides that only one coat of primer or sealer may be applied to new metal working equipment. No filler may be applied and not more than two coats of paint, enamel or lacquer may be used. Any color other than "old machine-tool gray" for the final coat of paint is prohibited.

★ ★ ★

LABOR-management committees for war production drives have been formed in 100 additional plants, bringing the total to 700 it was announced May 11 at war production drive headquarters.

INDUSTRIAL diamonds, vital in the war effort because of their widespread use in machine tools for cutting, shaping, drilling and marking, are subject to the general maximum price regulations, Price Administrator Henderson pointed out.

★ ★ ★

THE value of new machine tools, presses and other metal working machinery shipped during April was $114,100,000, it was announced today by William H. Harrison, Director of Production of the War Production Board.

Shipments of machine tools alone amounted to 25,415 units, with a total value of $103,364,496. During March, 24,300 units, valued at $98,358,299 were shipped.

Production of metal working machinery has reached a rate of more than $1,300,000,000 a year and is steadily on the increase. Last year the value of metal working machinery was about $840,000,000 and the present going rate represents an increase of more than 60 percent.

Compared with the same month of last year, the April value for all metal working machinery is an increase of 72 percent.

On the basis of comparable companies which reported during March and April, the value for the latter month represents a 5 percent increase. On a per day comparison between the two months, April represents an increase of 8 percent.

New Target for Industry:

More Dollars per Man per Month in the

PAY-ROLL WAR SAVINGS PLAN

TO WIN THIS WAR, more and more billions are needed and needed fast—AT LEAST A BILLION DOLLARS A MONTH IN WAR BOND SALES ALONE!

This means a *minimum* of 10 percent of the gross pay roll invested in War Bonds in every plant, office, firm, and factory in the land.

Best and quickest way to raise this money—AND at the same time to "brake" inflation—is by stepping up the Pay-Roll War Savings Plan, having every company offer every worker the chance to buy MORE BONDS.

If your firm *has* already installed the Plan, *now is the time*—

1. To secure wider employee participation.
2. To encourage employees to increase the amount of their allotments for Bonds, to an average of at least 10 percent of earnings.

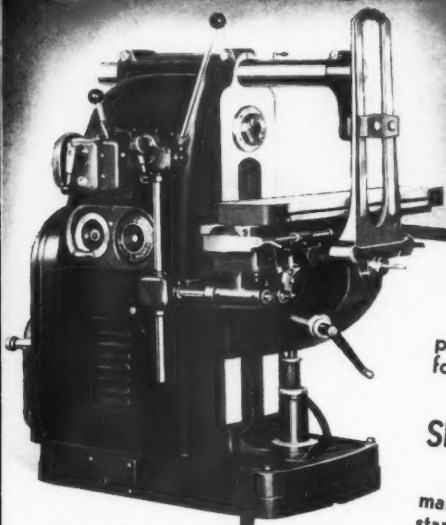
If your firm *has not* already installed the Pay-Roll War Savings Plan, *now is the time to do so.* For full details, plus samples of result-getting literature and promotional helps, write, wire, or phone: War Savings Staff, Section E, Treasury Department, 709 Twelfth Street NW., Washington, D. C.

U. S. War Savings Bonds

This space is a contribution to America's all-out war program by

The TOOL & DIE Journal Staff

For SMALL-PARTS PRODUCTION



SIMMONS 1A MILLING MACHINE

MICRO-SPEED DRIVE
provides wide speed range for any class of material or cutting tools.

SELECTOR DIAL CONTROL
makes speed change instantly — at a turn of the Selector Dial Control handwheel.

SPINDLE BRAKE & CLUTCH
for instant stopping and starting.

SPEEDS:
56—630 R. P. M.

RANGE OF FEEDS:
Horizontal, 34"; Cross, 8"; Vertical, 18½".

TIMKEN BEARING EQUIPPED

Designed for the rapid production of small parts, Simmons No. 1A Micro-Speed Milling Machine is efficient and simple to operate. By means of Micro-Speed Drive (our own variable speed transmission) and Selector Dial Control, any speed in its wide range—56 to 630 R.P.M.—may be instantly obtained at a turn of the handwheel adjacent to the selector dial on the column.

Thus the operator is assured the right speed for the job. And that means higher precision . . . faster, more economical production! Write TODAY for descriptive bulletin.

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1760 North Broadway Albany, N. Y.

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MICRO-SPEED
LATHES · TURRET LATHES · MILLERS · BORING MACHINES

FIRTHITE "HYPER-MILLING" HEADLINES THE NEWS!

"HYPER-MILLING" is as novel in principle as it is sensational in results. It uses double negative-rake angles (i. e., negative spiral or helical angles **and** negative rake). The effect may be visualized by imagining the tips mounted on the **back of cutter blades** and the cutter running **backwards!**

A TYPICAL PERFORMANCE—Firthite Cutters, with 10° negative rake and 10° negative spiral (helix) angle, are operated up to **10 times the speed** with resulting **6 times the feed** of high-speed steel mills—on hardened, alloy-steel parts. (Ordinary cutters with carbide tips proved impractical on this job.) Firthite Tips in "Hyper-Milling" Cutters solved the problem!

"HYPER-MILLING" may solve that tough, steel-milling job in YOUR shop . . . **details on request.**

Firth-Sterling
STEEL COMPANY

OFFICES: McKEESPORT, PA. NEW YORK HARTFORD LOS ANGELES CLEVELAND CHICAGO PHILADELPHIA DAYTON DETROIT

PUBLICATION PREVIEWS

Sales and Technical Literature

Send Requests on Company Letterhead

LUERS CUT-OFF TOOLS—Literature on the Luers Patented High Speed Steel Cutting-Off Blades is now ready for distribution by the Empire Tool Co., 8780 Grinnell Ave., Detroit, Mich. Tool engineers will find the diagrammatic application of interest. The patented features described are design allowances for chip expansion, speeded production and increased runs between grinds. Dimensions, blade sizes and prices are included.

"TOOL STEEL WELDING WIRES"—A new booklet has been issued by the Welding Equipment & Supply Co., 223 Leib St., Detroit, Mich., describing Eureka tool steel welding wires. The booklet explains the use of tool steel welding wires for composite construction and repairing of tools and dies. Complete specifications are included.

WELDON TOOLS—Catalog No. 8-A contains descriptions and complete details of such tools as end mills, collet holders, drive holders, cutoff blades and tools, etc. A special Tools Section illustrates the many and varied examples of special tools. Hardness conversion tables and a decimal equivalents chart will prove of value as also will a visual index page. In book form, with a board cover, Catalog No. 8-A will be an attractive addition to any shop library. Address Weldon Tool Co., 3001 Woodhill Rd., Cleveland, O., on your company letterhead for your copy.

SIMPLIFIES HEAT TREATMENT—"Sel-Car" paste and "Sel-Car" liquid are used and recommended by leading steel producers as a surface protection against decarburization to prevent carbon penetration of low carbon steels, in selective carburizing of low carbon steels and for many other uses where steels are being heat treated. A late bulletin lists the many applications of "Sel-Car" and recommends under what conditions the various grades should be used. The National Copper Paint Corp., 1762 Diversey Pkwy., Chicago, Ill., will send Bulletin No. 116 upon request.

DIEING MACHINES—The Henry & Wright Mfg. Co., 758 Windsor St., Hartford, Conn., has prepared a new catalog on "Dieing Machines". This 36-page handbook is illustrated by photographs and diagrams, ranging from 10-ton to 150-ton. It is an excellent treatise on the use and application of such machines in stamping production. A feature of interest to shop men is the illustrations of stamped pieces produced from multiple station dies. Added attachments such as automatic power straighteners, adjustable scrap cutters and stacking chutes are also shown.

SPEED—Veeco drafting machines give glider smoothness with thumb control for speed on war production orders. The B. K. Elliot Co., 124 Sixth St., Pittsburgh, Pa., will furnish their latest circular upon request.

KELKUT GRINDING OIL—Finish and precision limits are the results sought after today. With new machines, improved wheels, increased speeds, these results can be obtained with the addition of the proper lubricant. Kelkut Grinding Oil has been developed in order to produce these desired results. Descriptive literature can be obtained by writing The J. W. Kelley Co., 13207 Athens Ave., Cleveland, O.

SAFETY MARKING TOOLS FOR INSPECTORS—New descriptive literature available from M. E. Cunningham Co., 104 E. Carson St., Pittsburgh, Pa., describes the many safety features to be found in their marking devices and holders. For many years plants and factories have striven to increase safety in all phases of production. Cunningham marking devices are built to conform with both safety and service demands.

BERKELEY MOTORIZING EQUIPMENT—Three bulletins—Nos. 50, 60-X and 65—issued by the Berkeley Equipment Co., Dept. MD, Corry, Pa., describe and illustrate the more widely used applications of this motorizing equipment. Any or all of these helpful bulletins may be had by writing The Berkeley Co.

NEW HORIZONS

FORWARD - LOOKING manufacturers, because of thorough research and experience in their particular fields, can aid in establishing a better social and economic order in more ways than by providing machinery and merchandise. That is why Continental Machines, Inc., deal out fresh ideas and usable information every little while.

MACHINES CREATE EMPLOYMENT

During the gray days of the past decade, many people believed that machines were one of the chief causes of unemployment. In 1939 Continental published "Machines and Progress", a panoramic wall chart 5 feet long and 2 feet high, matching mechanical development through the years with employment figures. This study shows that machines are in reality the stepladders to higher standards of living. There are still a few of these charts on hand, if you'd like to have one.

STIMULATING YOUNG MEN'S INTEREST

Before there was too great a scarcity of mechanics and tool makers, Continental made a bold bid to young men everywhere to swap their frayed white collars for honest, money-making overalls. They published "12 Easy Lessons in Machine Shop Practice". This illustrated study course was distributed to schools, Y.M.C.A.'s, Boys Clubs, and hung in factories from coast to coast. It became so popular that it had to be reprinted this year. Would you like a copy?

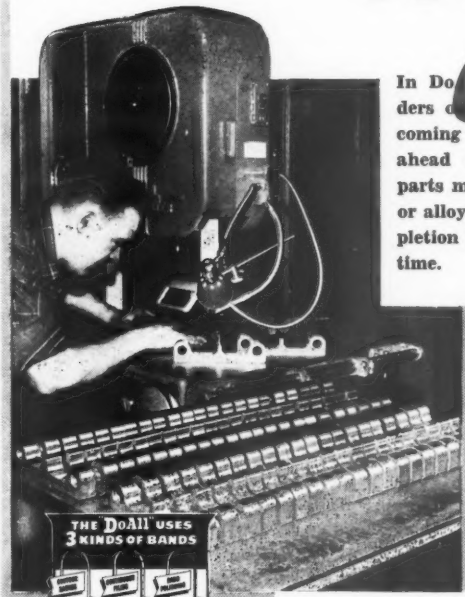
FREE TRAINING COURSES

The DoAll Trade School, Minneapolis, gives **Free** training in the use of DoAll Contour Machines, Surface Grinders, Lathes, Shapers, Milling Machines, etc. Into a short course are packed 200 to 500 hours of actual shop work, lectures, movies, experiments with new metals, etc. Sixty students are graduated and placed in industry every month. If you know a young man who wants to learn how to do a multitude of jobs faster and better, send for application blank. Or, it may be that you can use one of the School's graduates in your plant.

CUTTING COSTS

A brand new book of few words and loads of illustrations, prepared in a snappy, Chalk Talk style that won't let you put it down until you reach Page 48 and the last one of the "40 Ways To Cut Machining Costs." Let us send you a copy.

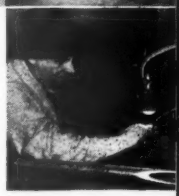
DoAll PRODUCTION Wizard



In DoAll equipped plants, war orders direct or sub contract are coming off the assembly lines far ahead of schedules. Products of parts made from any kind of metal or alloy are shoved through to completion in ½, ¼ and even ⅛ formed time.

Left—Production work on Swedish steel 1" thick. A much improved and faster method over shaping or milling.

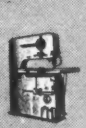
Right—Internal finishing of large brass collector rings.



Steel alloy aircraft tub cutoff production for a plane motor mounting frame work. New war-time job for this firm.

THE EXACT SIZE FOR YOUR JOB

Under $5000



Under $2500

Under $2000

Under $1500

Under $1000

All Models with Motors

DoALL AIM

To shorten the war and get back to peace-time work on everything American from automobiles to lawn sprinklers.

DoAlls offer the fastest precision method to remove metal. They relieve $5,000 to $50,000 machine tools of over-load work and have become absolute *musts* in every modern plan

BETTER INVESTIGATE

Let us send a factory-trained production ma to your plant with a DoAll to show you how can short-cut your orders to completion.

NEW BOOK—"DoAll on Production"—50 pictures of DoAlls at work all over the country Prepared for quick reading by busy men. Send for copy.

CONTINENTAL MACHINES, INC

PUBLICATION PREVIEWS

(Continued from Page 62)

MODERN MACHINE VISES FOR MACHINE TOOLS—The Producto Machine Co., 990 Housatonic Ave., Bridgeport, Conn., in their new Bulletin illustrate and describe the 6" Heavy Duty Vise, the 4½" General Purpose Vise, the Producto Cam Lock Vise, the Quick-Lok Vise and the Bay State Tool Room Vise. Particular attention is called to the 6" Heavy Duty, available in both plain and swivel types, which is an indestructible machine shop vise with extraordinary capacity. Free copies of Bulletin No. 205 will be sent upon request.

McCROSKY TURRETS—These turrets may be mounted on a lathe in three ways—in the T-slot of the compound rest, bolted to the bolt circle of the compound rest, or attached to the cross slide as a carriage turret. Bulletin 15-EJ contains many illustrations, diagrams and complete specifications of the McCrosky turrets and attachments. Send for your copy. Address McCrosky Tool Corp., Meadville, Pa.

L & R SOLUTIONS—The cleaning machines and solutions described in this bulletin have been recently developed to clean larger units in every field where a precision cleaning problem exists. Many photographs make this bulletin interesting and valuable. Your copy is available by writing L & R Mfg. Co., 53 Clinton St., Newark, N. J.

DOALLS ON PRODUCTION—A story in pictures of the DoAll in action on the Nation's production front. This 82-page pictorial of actual shop applications of the DoAll Contour Machine for band sawing, band filing and polishing will be sent upon request on your company's letterhead. Address Continental Machines, Inc., 1301 S. Washington Blvd., 1303 S. Washington Blvd., Minneapolis, Minn.

HICYCLE PORTABLE TOOL CATALOG—A wide range of portable electric drills, reamers, screw drivers, nut runners, stud setters, tappers, grinders, buffers, sanders and polishers are described and illustrated in Catalog No. 900. A section is devoted to each product, showing typical applications, available models, specifications and construction data. Special applications are also described. Die makers will be particularly interested in the section on die grinding. Direct your request to the Chicago Pneumatic Tool Co., 8 E. 44 St., New York, N. Y.

BULLETIN NO. 501—issued by Progressive Welder Co., 3048 E. Outer Drive, Detroit, Mich., is descriptive of the design and operating features of the Standard Pedestal Welder. In addition to describing the operation and design of the welder, the four-page folder also embodies a number of illustrations showing how, through the application of special fixtures, etc., specialized spot welding operations may be performed. Copies of the Bulletin may be obtained on request.

D & W MAGNETIC CHUCKS—An extended line of flat, rotary, swivel and vertical chucks, together with attachments to adapt flat chucks for taper grinding, are described in detail in a bulletin issued by J & H Electric Co., Inc., 201 Richmond St., Providence, R. I. A chart showing current consumption of D & W Chucks will prove of interest.

STANDARD STEEL SHAPES—The function of this booklet is to bring to the attention of the purchasing agent and design engineer a number of standard steel shapes which can be purchased as production items without die or tool charges. Blueprint drawings with complete specifications depict each shape available. Send requests to The Commercial Shearing and Stamping Co., Dept. 55, Youngstown, O., and ask for Section No. 3.

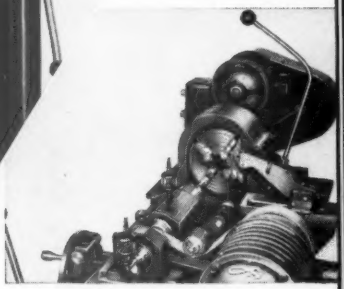
"CUT DRILLING COSTS"—This catalog illustrates, generally, some of the varieties of multiple spindle heads and units (all of which are special) which can be designed by the Hoefer Manufacturing Co., Dept. F, Freeport, Ill. Catalog F is a helpful aid in suggesting designs of multiple spindle heads when reduction of drilling costs is being considered.

TUNGSTEN ELECTRODES FOR ATOMIC HYDROGEN WELDING—This bulletin gives complete information including specifications of the full range of sizes of the electrodes as now offered by Vascoloy-Ramet Corp. The ever increasing number of users of atomic hydrogen welding will be interested in the new source of supply for the necessary pure tungsten electrodes. For Bulletin No. W-421 address Vascoloy-Ramet Corp., Dept. TJ, N. Chicago, Ill.

"CARE OF GAGE BLOCKS"—The George Scherr Company offers a four-page booklet entitled, "The Care of Gage Blocks" which reveals up-to-date methods of increasing the usefulness and life of gage blocks. During these times when there is a shortage of gages and precision tools every toolmaker and mechanic who works with precision length standards can gain information from this study. Copies may be obtained upon request from the George Scherr Co., 128-B Lafayette St., New York, N. Y.

Saw-way MULTI-PURPOSE INTERNAL GRINDER

Headstock moved back and at angle position for grinding tapered hole.



Looking down on top of machine from grinding spindle end.

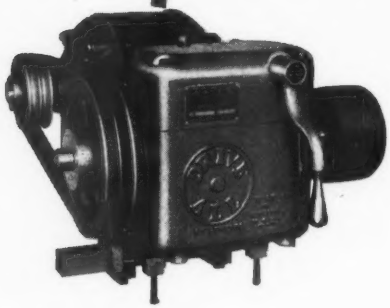
Offers greater flexibility . . . a precision grinder, designed and built by engineers with years of practical experience to guide them . . . has a headstock traverse of 6″ . . . grinds holes ¼″ to 18″ in diameter . . . holes up to 9″ deep, straight or tapered . . . entire headstock may be moved at right angle to wheel traverse, by merely loosening two conveniently located nuts . . . worm compensating device permits grinding wheel head adjustment to .0001 . . . sturdy construction throughout . . . full specifications, delivery time and price on request.

Distributors throughout the U. S. and Canada to serve you.

Saw-way TOOL AND MACHINING CO.

13836 JOS. CAMPAU AVE. DETROIT, MICHIGAN

SECOND WIND FOR VETERAN MACHINES!



For Drill Presses, Radials, Shapers, Planers, Automatics, Boring Mills, Millers, Lathes, Turret Lathes, Tappers, Gear Cutters and Other Standard and Special Machines.

Many of your older machines are a priceless asset today when new machine tools are hard to get. And their production capacity is probably well over their best past record, too. Have you considered making them more efficient with a NEW, individual motor drive? In hundreds of plants today older machine tools equipped with DRIVE-ALL motorizing units are making NEW records. Available promptly, installed quickly, 1 to 10 h.p. with 3-speed or 4-speed gear box.

Write for literature and name of local representative

DRIVE-ALL

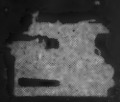
MANUFACTURING COMPANY

3400 CONNER AVE. DETROIT, MICHIGAN

DRIVE-ALL

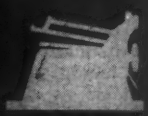
DRIVE-ALL

DRILL PRESSES AND RADIALS

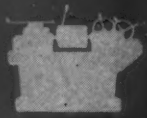


SHAPERS AND PLANERS

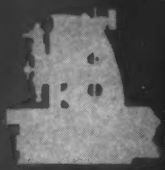
MILLING MACHINES



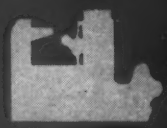
SPECIAL APPLICATIONS



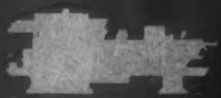
AUTOMATICS AND TAPPERS



BORING MILLS



GEAR CUTTERS



LATHES AND TURRET LATHES

DRIVE-ALL
MANUFACTURING CO.
3400 Conner Avenue
Detroit • Michigan

Tell me more about motorizing:

Kind of Machine	Maker	Size	Speeds High	Speeds Low

Name_____

Company_____

Street_____

City_____ State_____

Air Tool Life Prolonged with CCA Filters

FILTERS, Inc., manufacturers of filters for cleaning compressed air lines announce the addition to their line of a two-outlet and a three-outlet filter for serving two or three air tool operations at one point.

The CCA (Conditioned Compressed Air) Filter prevents harmful dust, rust scale, oil and water from going into valuable air tools and prolongs life and efficiency of costly pneumatic equipment. CCA Air Filters cut down the number of rejects on precision-machined parts, which can be damaged by the sand-blasting effect of dust and moisture in the air jets. Centrifugal action of the air within the filter removes 90% of the dirt and moisture and the balance is filtered out by a special wool-felt glove. For cleaning, the water and dirt are blown out of the drain valve at the bottom of the bowl and filter may be completely dismantled without disconnecting from the line.

The 3-way manifold air filter illustrated here was developed in collaboration with Burklyn Corporation, distributors of the Hansen Coupler. This clever combination provides a handy plug-in of air tools as simple as plugging an electric cord into the wall. This collaboration represents a fine example of separate companies putting their products together to produce a better device for speedier war production.

Information regarding the CCA Filter can be obtained from Filters, Inc., 1517 Gardena Ave., Glendale, Calif.

You Can CROWD MORE
STAMPING PRODUCTION
into fewer hours with a
LOW COST
★DIEBEL
500 RPM Hi Speed
PRESS

★ Automatic operation plus simplicity of design
★ Feed may be shut off without stopping press
★ Easy access to dies for setting — generous die space
★ 3 high operating speeds — 180, 370 and 500 strokes per minute

★ KEEP UP WITH WAR-TIME NEEDS
Write for a copy —

DIEBEL DIE & MFG. CO.
3653 LINCOLN AVE. CHICAGO

use

RACINE *HIGH SPEED* OIL-CUT SAWS

Over 3,000 pounds of compact sawing machinery—designed and armored to cut the heaviest loads and toughest alloys twenty-four hours a day—are represented in RACINE Oil Cut Saws with automatic bar feed. In 6″ x 6″ capacity they easily handle bars in any standard length and loads up to 2,000 pounds.

This is real automatic sawing! Identical pieces from long bars and tubes are hydraulic measured and cut off in any desired length from $\frac{1}{16}$″ to 42″. Setting a single pointer on a graduated scale gives you accurate cut lengths and the setting of a graduated dial gives you the correct cutting feed for the size of bundle and type of material being cut. There is no guesswork and your material is smoothly handled—quickly cut off by positive oil cushioned hydraulic power. Simple, rugged, fool proof design that inexperienced hands can operate and maintain highest production standards.

Write today for catalog No. 60-A or for information on any of RACINE'S full line of modern metal cutting saws—from general purpose utility type machines in 6″ x 6″ capacity to production models in 6″ x 6″ to 14″ x 20″.

"STANDARD THE WORLD OVER"

RACINE TOOL & MACHINE CO.
1768 STATE ST. ··· RACINE, WIS.

Drill Press Incorporates New Design Features

THE new 20″ power feed drill press has, it is claimed, incorporated in its design many worthwhile features that set an entirely new standard of values from the standpoint of production, service and first cost.

Sturdily constructed throughout, this drill press has unusual capacity and a wide range of spindle speeds. Equipped with balanced aluminum alloy, cone pulleys and precision ball bearings, holes from No. 50 up to 1″ in diameter may be drilled with equal accuracy.

The power feed unit is compact in design and smooth in action. It is driven from the drill press spindle and has a range of four speeds for each spindle speed. The feed mechanism is engaged by means of a conveniently located lever and a built-in clutch. The clutch may be adjusted to slip at a predetermined load or for positive feed up to the capacity of the machine—the feed may be engaged instantly at any point of the spindle travel. An automatic, positive release assures holes of uniform depth and adjustments are quickly made.

Rack and pinion raising mechanisms are supplied for the table on the single spindle machines and for the drill head on the multi-spindle models. A ball bearing collar supports the rack and makes precise adjustments of the machine a simple matter.

An illustrated folder will be sent on request to Walker-Turner Co., Inc., Dept. TD, Plainfield, N. J.

Not Affected BY OIL OR HEAT

DE-STA-CO ARBOR SPACERS

Made of metal, these spacers are not affected by oil, or heat . . . may be used over and over again, thus cost per time used is low. Use these spacers for quick set-up of milling machine cutters and for all low cost, accurate spacing requirements. Stock sizes .001″ to .125″ thick. Specials, any length, cut from bar stock, ground to decimal.

TRIAL ASSORTMENT—enough for average use on one machine sent for $1.00. Give arbor size. Size and price list sent FREE!

DETROIT STAMPING CO.
Established Over 25 Years
344 Midland Ave • Detroit, Mich.

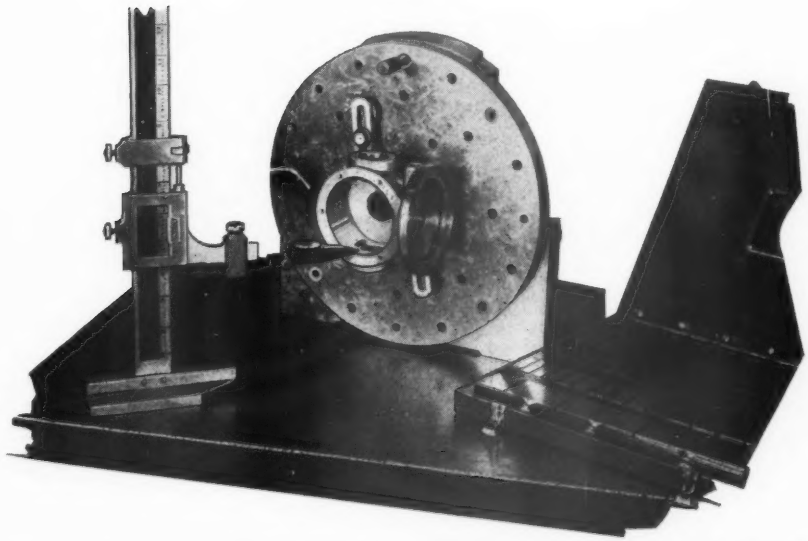
The right answer - - ALWAYS

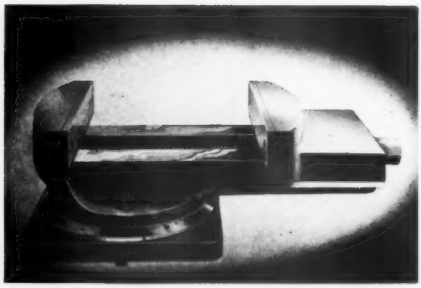
The BECKER INDEX MASTER does not make mistakes. It is a precision unit all the way through . . . and does precision work all the way through. Whatever the part —aircraft, navy or ordnance —you can be sure that the BECKER INDEX MASTER accurately and speedily determines its conformance with drawing specifications.

Comparing the present methods used in the inspection and layout of tools and parts where a bevel protractor sine bar must be set for each dimension, you can readily see the great advantage of using the BECKER INDEX MASTER—which saves valuable time.

A new descriptive circular on the BECKER INDEX MASTER is available. Address:

THE BUNELL MACHINE & TOOL CO.
1620 E. 24th St. Cleveland, O.





Victory Vise Does Big Jobs with Precision

A "BIG Vise for the big jobs" has just been announced by the David J. Ross Co., Benton Harbor, Mich., manufacturers of punch presses and production equipment. Called the "Victory" Vise, this new tool combines large size with accuracy to .001. "The Victory Vise is our answer to the demand for a heavy precision vise that will maintain its accuracy and decrease setup time for the operator", states Oral B. Wright, General Sales Manager. "It is interesting to note that while our new vises are made in three sizes; 7", 10" and 13", the majority of our inquiries are regarding the big 13" model for which there is a special need among war goods manufacturers."

Besides accuracy and ruggedness, the Rousselle Victory Vise provides clearance for full freedom in swiveling over base clamps. A hardened steel screw nut which is easily removable and a novel clean out hole below the stationary jaw for quick removal of chips and waste from around the screw are extra features obtainable with the Victory Vise. This new product was designed by Edward Rouselle, chief engineer and designer of the well-known Rousselle Punch Presses which this company has manufactured for a number of years.

A circular can be obtained by addressing David J. Ross Co., 107 Ross Park, Benton Harbor, Mich.

The above photograph shows the heat treating department of a large manufacturer of Bomb Tail Fuses. The equipment consists of one Johnson No. 820 Drawing and Tempering Furnace; one Johnson No. 130-LT Hardening Furnace for Manganese Moly Steel; one Johnson No. 130 High-Speed Steel Hardening Furnace and one Johnson No. 550 Liquid Hardening Furnace with Standard Hood.

Maximum Temperature in Less Than 30 Minutes

using any Johnson Furnace. This means a saving of up to 2½ hours on production time. Johnson Furnaces save up to 50% on gas consumption over ordinary units. Get the facts—and you'll install Johnson Furnaces.

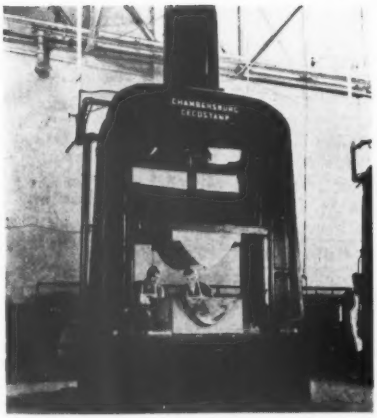
SALES OFFICES;
Bourse Bldg., . . Philadelphia
120 Liberty St., New York City
C. B. Babcock Co., 475 11 St., San Francisco

JOHNSON GAS APPLIANCES FOR EVERY INDUSTRIAL PURPOSE

Johnson Gas Appliance Co.
560 E Ave., NW.
Cedar Rapids, Iowa

→ FREE *Write for New Johnson Catalog*

Cecostamp Forms Difficult Metal



HIGH strength metals such as stainless steel and many aluminum alloys present a forming problem that taxes the most modern type of stamping machinery. The Cecostamp provides a means for forming these difficult metals with fewer operations and greater true-to-die accuracy.

Successful hot forming of thin work is accomplished by controlled impact forging. The operator adjusts the Cecostamp for the required rapidity and power of successive blows necessary to form the metal before it has cooled beyond good workable condition.

Embossing and shallow forming is handled differently with the Cecostamp. Embossing is easily accomplished by controlled successive impact blows—an operation which flows metal into dies without drawing it and without danger of tears or ruptures.

Accurate control of speed and intensity of hammering operations are designed features of the control mechanism. With an air operated Cecostamp, more blows per minute are attainable than with a gravity type stamp. Economy is attained with the use of air in that the cylinder bore is comparatively small in diameter and most of the operating strokes of the machine are short.

The assembly of the various parts of the Cecostamp provides an accurately aligned mechanism to guide each working stroke.

Direct requests for Bulletin No. 267-J to Chambersburg Engineering Co., Chambersburg, Pa.

Sharp Tools Wear Longer... Do a Better Job

SAVE YOURS with

QUEEN CITY GRINDERS

BALL BEARING BENCH, PEDESTAL and DISC TYPES

Tool grinding is only one of the many jobs handled efficiently by Queen City Grinders.

They are built in a complete range of sizes in bench, pedestal and heavy duty box type bases in units from 1 H.P. to 10 H.P.

These grinders are powerful—sturdy units equipped with two Carborundum wheels, one coarse, one fine—safe enclosed wheel guards with built in exhaust—Allen Bradley push button switch with overload protection—adjustable and safe work rests—tool tray—water pot—adjustable, shatter proof, clear glass eyeshields.

All Queen City Grinders come fully equipped with grinding wheels, ready for immediate use.

The initial cost is also comparatively lower than most grinders.

QUEEN CITY DEALERS at your Immediate Service

Geo. M. Bernstein & Co.	Chicago, Ill.
Indianapolis Machinery & Supply Co.	Indianapolis, Ind.
James W. George Machinery Co.	Detroit, Mich.
Eichman Machinery Co.	Kansas City, Mo.
McDonald Machinery Co.	St. Louis, Mo.
Cincinnati Machinery & Supply Co.	Cincinnati, O.
Hess-Schenck Co.	Cleveland, O.
E. W. Smith Machinery Co.	Columbus, O.
C. H. Gosiger Machinery Co.	Dayton, O.
Elyria Belting & Machinery Co.	Elyria, O.
State Machine Tool Co.	Milwaukee, Wis.

QUEEN CITY MACHINE TOOL CO.

218 EAST SECOND ST. CINCINNATI, OHIO

(Continued from Page 40)

there is a wide field for multiple type gages on the more common everyday types of jobs which could not afford the more elaborate and completely automatic designs.

The trouble with most of the multiple types of Dial Indicator Gages is that the designer frequently becomes involved in mechanical design and forgets to maintain accuracy. The more directly the indicator is brought into contact with the work piece, the greater are the chances of maintaining accuracy. At the same time, consideration must be given to the fact that the inspector is a fast worker and that the gage will receive some abuse, hence the sensitivity of the indicator must be guarded from such abuse. An indicator which is *not* sensitive cannot be accurate and that applies to any details of the gage which must transfer the motion of the contact point *on the work itself* to the indicator.

Rocker, arms, pivots, sliding members, *and every other unit used in the gage which transfers the motion of the contact point on the work to the indicator, must be free of friction, inertia, loose fits, contraction, expansion, deflection and all other factors* which will cause inaccuracies. These are important requirements and neglect of them will cause many an argument as well as bring condemnation of many a gage which would have been entirely practical if properly designed.

Some designers use roller V-blocks and on very heavy work they may be necessary, but ordinarily they only add opportunities for inaccuracies. With all due respect to the accuracy of roller bearings, there has to be a few tenths allowance between the balls or rollers and the raceways as well as in the balls themselves. Consequently inaccuracy starts to cut in on the inspection. On many a gage, a great part of the tolerance which the gage is supposed to check is used up in the sloppiness or inaccuracies of the gage.

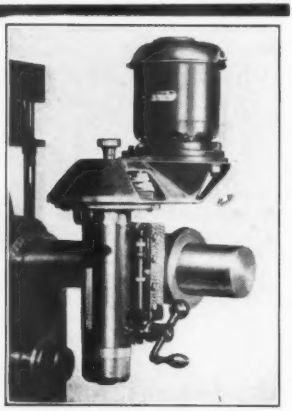
Keep all contacts between the work and the indicator as direct, simple and free of breaks and lost motion as possible. Study the reference points — the point or points, with which the dimension is compared to the indicator point of contact. Be sure they are positive, that wear and dirt will not influence the accuracy and that they are correctly placed.

HALCO

Universal Head

Speed Accuracy Dependability

FOR HIGH SPEED MILLING, DRILLING, BORING AND COUNTER BORING ON ANY ANGLE



Motor of heavy duty type, ⅓ H.P., 110 volts, 60 cycle, with plug-in cord and switch. Easily reversible for L. H. cutters. Five speeds 350 to 2900 R. P. M. Also 10 speeds 125 to 2900 R.P.M. available at extra cost.

PROMPT DELIVERIES

Over 500 Now in Use

THE Halco Hi-Speed Universal Milling attachment is designed to meet the demand for greater efficiency, better workmanship, and for speed in building tools, dies, jigs, fixtures, wood and metal patterns, and other machine products where accurate and fast machining is of prime importance.

With its 4 inch vertical travel, many drilling, milling, boring and facing operations can be accomplished in one setup. The total weight is approximately 90 pounds, and it can be easily mounted by one man.

Write for folder giving details or order now for quick delivery.

HALCO PRODUCTS CO.

14231 Birwood - Detroit, Mich.

DIAL INDICATOR GAGES

Are Faster

THESE gages are outstanding in performance. They are positive, quick to set up, fast in use. Experience has proven their efficiency.

CYLINDER AND BORE GAGE — is sensitive, accurate, entirely mechanical, free from excess friction and lost motion.

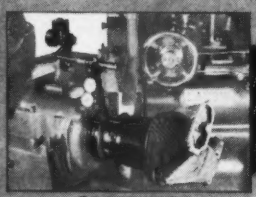
GRINDING GAGE — definitely saves time, money and material.

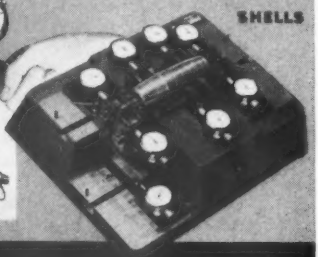
CALIPER GAGE — has hundreds of applications.

GUN BORE GAGE — checks both "lands" and grooves without costly extras. Fast, accurate, and entirely mechanical.

What have you to inspect?

FEDERAL PRODUCTS CORPORATION
Providence, Rhode Island





★ ★ ★ ★ ★ FEDERAL ★ ★ ★ ★ ★

PRECISION MEASURING INSTRUMENTS

Chicago • Cleveland • Detroit • Hartford • Los Angeles • Milwaukee • Montreal • Muncie
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Sawing Operations from Bi

IN the manufacture of 155 mm shell, sawing operations play an important roll. At the very beginning of the manufacturing procedure, bar stock 20′ long and 5½″ x 5½″ square has to be sawed into billets. This operation may be divided into six distinct parts.

1. The blade is lowered to and fed into the work under the correct hydraulic feed pressure.
2. At the conclusion of the cut the blade rises clear of the cut.
3. The stock locking vise opens.
4. The remaining piece of stock moves forward.
5. The length of stock is automatically gaged.
6. Locking vises are closed hydraulically and the cycle repeats.

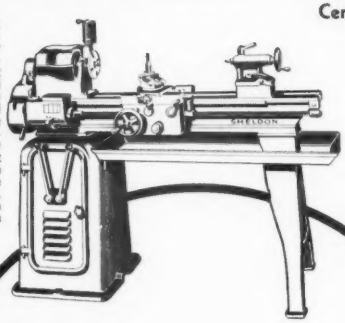
Sawing continues at the speed set on the dial indicator until the last remaining stub of material automatically stops the saw for reloading.

The required length of the pieces for forging 155 mm shell is 15″. It is very important that the billets be cut accurately to length and absolutely square to avoid trouble at the forge. When the cherry-red billets are removed from the furnaces, they must set squarely on end, ready for drawing and piercing. Besides the importance of square, accurate cuts it is essential that the face of the cut be protected against the damaging effects of high cutting temperatures and fractures.

SHELDON

LATHE
No. U-1236 WQ
12¼″ Swing, 36″ Center Distance

*The Sheldon U-type underneath Motor Drive is a 4-speed V-belt drive, enclosed in the pedestal base leg. Speed changes are made instantaneously by external shift levers which operate clutches. Available with all Sheldon Lathes.



This is a quality precision lathe with large special analysis steel spindle ground all over and 1″ round collet capacity. Hand scraped bronze spindle Bearings. (Also available with Ultra-Precision Ball or Super-Precision Roller spindle bearings), Full Quick-Change Gears. Double-walled Worm Feed Apron with Power Cross Feed, Heavy strutted and cross-braced semi-steel bed with hand scraped ways (2 V-ways and 2 flat ways) and U-type Lever-operated 4 speed Motor Drive.

SHELDON MACHINE CO., Inc.
4236 No. Knox Ave., CHICAGO, U.S.A.

Billets to Bullets

High cutting heat may alter the analysis of the stock. Any cutting method that causes fracturing may be responsible for costly damage to equipment and take the life of our gun operators in battle. Sawing cannot surface harden nor fracture the precious metal. The cool cutting blade removes as little as $\frac{1}{16}$" of fine steel chips which are instantly washed away by the coolant. The small amount of metal removed means less cutting time in the shell plant, less haul-back tonnage for the railroads and less reroll time for the steel mills.

Billets move fast at the forge. As a red-hot billet is lifted out, another squarely cut piece, 15" x 5½" x 5½" is dropped into the gas and oil fired rotary furnace to start its cycle in heat treatment. The treated billet is dropped onto a conveyor, passed through a scaling operation and dropped nose downward into a thousand ton hydraulic piercing punch press. In 2½ seconds the billet is drawn to a length of 29½" and 6¼" in diameter. A 300-ton hydraulic ram ejects the shell forging which is set aside, cooled and later conveyed to the machine shop where it is turned to size.

After the shell forgings have been turned down to correct dimensions by machining, they are placed in double line formation on the conveyor line and sent through the saw for the final butt-end cut.

A 14" Peerless High Duty Saw, manufactured by Peerless Machine Company, Dept.

(Cont'd on Page 115)

(Continued from Page 50)

Torch heating can be used with many combinations of fuels — oxy-acetylene, oxygen and city or natural gas, air and acetylene, and air and gas. Best results are obtained on most work with the faster heating and more flexible oxy-acetylene torch. Recent developments of multi-flame tips have speeded up efficiency and made it easier to heat uniformly.

Furnace heating by oil, gas or electricity can be used for heating assembled parts with the brazing alloy preplaced. Heating can be timed so that the work can be removed as soon as the alloy has flowed completely.

Incandescent carbon heating permits rapid heating under pressure and is used extensively. The parts to be joined are assembled between electrodes in which heat is generated. The heat is easily controlled and confined to small areas. Pressure holds the joint members together, eliminating the necessity for jigs.

Induction heating, while widely used for melting and heat treating, has only recently been applied for silver alloy brazing. The heat for brazing is generated inside the metal to be brazed. This reduces oxidation and simplifies cleaning.

The Metal Bath and *Chemical Bath* are two dip heating methods. In *Metal Bath* brazing the filler metal is obtained from the molten metal bath. In the *Chemical Bath* the brazing alloy is placed prior to dipping. Both methods have the advantage of quick heating, controlled temperature and protection from the oxidizing effect of the atmosphere.

Finishing

Filing and grinding is eliminated in most cases where silver brazing alloys are used due to their penetration into joints. Where a joint requires some grinding or polishing, the close fit between parts leaves a finished joint where the brazing alloy shows as a fine line and is practically invisible.

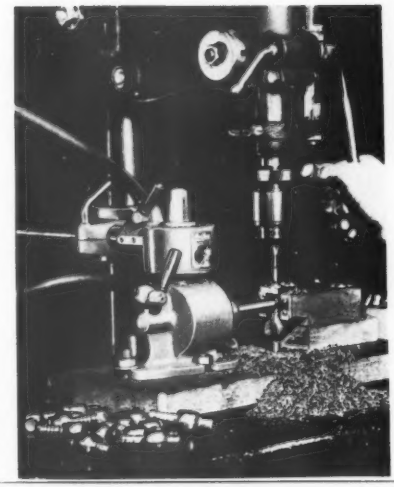
New industrial use for silver in war production is described authoritatively by A. M. Setapen in an article entitled "The Use of Silver Alloys in Brazing" on page 48 in this issue.

If you're not using TECO Carbide Dies, you're not producing cartridge cases at full capacity. This statement is based on records in leading ordnance plants—and can be proved in your plant. How? Set up a machine with TECO Dies, then compare quantity per day—volume per die — on-size accuracy — quality of finish—reduction of rejects. Make the test now. Tell us your requirements.

- DRAW DIES
- NECKING DIES
- SIZING DIES
- TAPERING DIES
- BULLET DIES
- SWAGE DIES

TUNGSTEN ELECTRIC CORPORATION
574 39th Street • • • Union City, N. J.
Branch Office: 2906 Euclid Avenue, Cleveland, Ohio
Pioneers in Tungsten Carbides for Over a Quarter Century

Double Drill Press Output



AN interesting use of the Models 4X and H4 Mead Air Clamps are illustrated. Two different Air Clamp models supplement each other and, it is claimed, more than double the output of the drill press. The operation calls for drilling a $\frac{5}{32}$" hole a little over an inch deep into the intake end of a brass valve body.

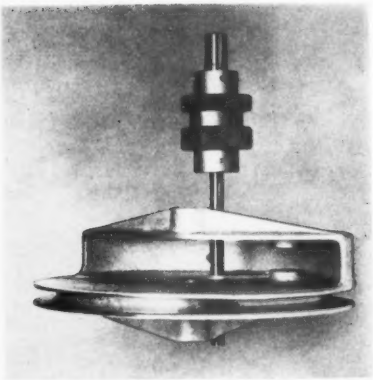
The fixture consists simply of a hardwood base with a built up block at one end having a vertical V notch lined with steel to locate the shank of the valve body. On top of this block is a steel plate with a hardened drill bushing. Model H4 Air Clamp holds the valve body into the vertical V notch during the drilling operation. Model 4X, mounted on the column of the drill press, holds the entire fixture in position and alignment. This Air Clamp is left "on" all the time that the fixture is being used. In this case, no Mead Foot Control was used as it was found that the operator could more conveniently use the regular hand valve on the H4 Air Clamp.

This setup is but one of the many Mead Air Clamp applications developed for hold-down work. The manufacturer has also created the successful Mead Foot Control for Air Clamps and other air-operated devices, which free the operator's hands and speed up work.

Additional information can be obtained from Mead Specialties Co., 15 S. Market St., Dept. 29, Chicago, Ill.

The Jackson No. 2 Verticle Milling Machine, ruggedly built of quality materials, will prove indispensable for Tool Room or Production applications. 5 speed V-belt drive, sturdy 4¼" quill and ¾" spindle capacity 8" x 32" table.

JACKSON
MACHINE & TOOL COMPANY SALES DIVISION
956 Roberts St. Jackson, Michigan



Burr Removing Time Cut to a Minimum

AN entirely new burring tool that is particularly effective and valuable in removing burrs from the inside edges of multi-walled parts has just been announced.

According to the manufacturer, this new burr removing tool cuts finishing time to a minimum by eliminating slow and costly hand methods of burring. The tool is simple in construction and operation. Used in a drill press, lathe or other machine spindle, this new burring tool is kept in continuous motion while parts are fed to it as fast as the operator can handle them. It consists of a cylindrical shaft which pilots in the hole to be deburred. At one end of the shaft is fastened a knurled collar that can be grasped and held by the hand even while the shaft is rotating. By sliding the collar up or down, the burring blade may be advanced into cutting position or withdrawn.

The cutting blade is of special tool steel and can be easily and quickly removed for resharpening. When completely worn down it can be replaced. All essential parts are case hardened and ground.

Designed to help speed up finishing time, this new Nobur Tool met with such enthusiasm that priorities have been obtained and the tool is now in quantity production.

Literature describing applications and uses is available from Nobur Mfg. Co., 6156-J Santa Monica Blvd., Hollywood, Cal.

Backing Up The Men
At The BATTLE STATIONS

THESE scenes in the plant of the Goss Printing Co. show skilled American workmen building heavy caliber anti-aircraft guns for the U. S. Navy . . . a job that has already won the coveted Navy "E" pennant for excellence. In this plant, as in most plants throughout the "Arsenal of Democracy," Starrett Precision Measuring Tools are helping to maintain the highest standards of accuracy . . . helping to produce more and better planes, tanks, ships and guns for the fighting men of America.

THE L. S. STARRETT CO., Athol, Massachusetts, U. S. A.
World's Greatest Toolmakers

STARRETT
PRECISION TOOLS • DIAL INDICATORS • GROUND FLAT STOCK
HACKSAWS • METAL CUTTING BANDSAWS • STEEL TAPES

Quicker, More Accurate Filing

EVERY tool and die man knows that the filing machine is one of the most troublesome and inaccurate tools in the shop. This is a largely due to the crooked file shanks which bend off at a different angle from the file itself during the hardening process. In a great many cases it is almost impossible to impart an absolutely true vertical motion to the file.

The All American Filing Machine, it is claimed, has solved this difficulty. This machine has a universal joint file clamp enabling the operator in a few moments to set the file absolutely square with the table, insuring work of utmost accuracy. This quick, easy method for compensating for even the slightest distortion in the file shank not only insures accuracy but also adds speed and economy to shop work requiring filing.

The precision ground table, measuring 8¼" x 8¼", is set horizontal by a hardened, ground registration pin operating through a hardened and lapped bushing in the rear of the table. The table may be tilted in two directions by removing the register pin, loosening the clamp knob and then setting the table at the desired angle.

The All American Filing Machine has a ¼" hp motor developing 1725 rpm, a ¾" stroke and is readily portable as the net weight is just 45 lbs.

Additional information and descriptive literature is available by writing the Industrial Engineering Co., Inc., 141 W. Jackson Blvd., Chicago, Ill.

DOUGLAS

PLAIN MILLER

FOR SMALL PARTS PRODUCTION

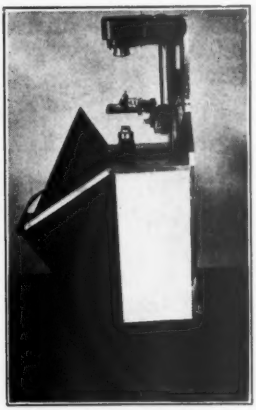
WIDE RANGE OF SPINDLE SPEEDS from 75 to 1200 R.P.M.

TABLE SIZE 32" x 8"

QUICK DELIVERY BY LARGE SCALE PRODUCTION

DOUGLAS MACHINERY CO. INC.

150 BROADWAY NEW YORK, N. Y.



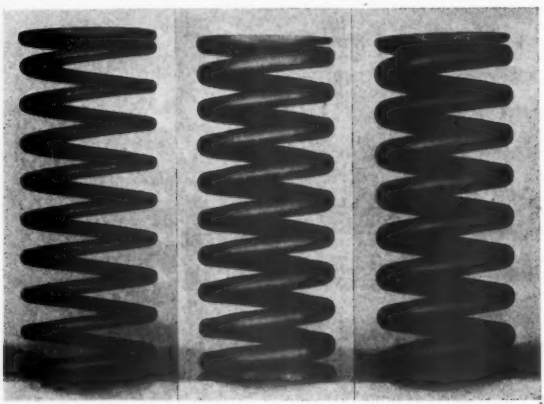
Optical Accuracy By Enlargement

THE Portman Optical Comparator is a complete unit consisting of a substantial pedestal type base, optical projection chasis, work table and illuminating system. With the extreme enlargements that this projection principle of inspection employs, rigidity is most important. The Portman construction is rigid and is manufactured under modern precision methods. The base pedestal encloses the entire projection system, from the lens to the reflecting mirror to the screen, in a rigid but adjustable fixed position. It also supports the focusing work table, sliding on accurately gibbed dove-tailed ways for assured optical precision.

The mechanical simplicity incorporated in the design results in extreme ease of operation. The only adjustment is to bring the object into proper focus. The work table supporting the object and the screen are so arranged that both image and object are always in view. Several persons may view the result at the same time. The image on the screen is always sharp and clear and is usually directly compared with magnified reference drawings made on tracing paper or with outlines traced directly on the screen itself.

Principal dimensions: Overall height 58″; width 22″; depth 27″; screen size 14½″; weight approximately 325 lbs.

For more detailed information, write Portman Machine Tool Co., 21 Beechwood Ave., Mount Vernon, N. Y., and ask for Bulletin OCJ-10.



In Stock—

THREE LINES OF DIE SPRINGS

● Three complete lines of springs from which the designer may select the spring especially designed for the job. Precision made from material selected for longer spring fatigue life and trouble-free die operation. Designed by experienced engineers for accuracy, resiliency and a minimum of crystallization.

Send for new Die Spring Bulletin.

DIE SUPPLY COMPANY

J. R. Fitzsimmons W. H. Fitzsimmons Jos. T. Fitzsimmons

Telephone CHerry 6818

1390 East 30th St. Cleveland, O.

Need service or a product in a hurry? Then turn to Buy With Confidence—pages 114-122.

New Bending Press for Many Thicknesses

A NEW Steelweld Bending Press with double bed and ram extension for bending and forming plate up to 20 feet in width has recently been announced.

Various plate thicknesses may be handled depending upon the plate width. The picture above shows a 20′ plate $\frac{5}{16}$″ thick being bent. The same machine will bend ½″ plate up to 12′ in width and even heavier plate that is less in width.

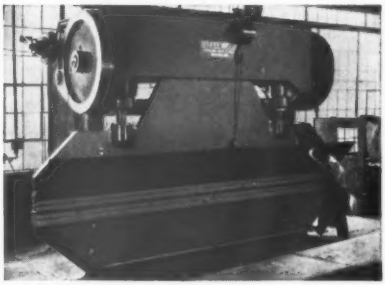
Like all presses in the Steelweld line, the frame is of the one piece all welded steel construction and will remain rigid for life.

Shafting and machinery are located at the rear of the machine, thus preventing damage from bent-up plates, crane hooks, etc.

Two solid forged steel eccentrics, one on each end of the machine, operate the ram. Each eccentric has three extra large main bearings and an eccentric bearing. The bearings are automatically lubricated by two pressure-type oiling units mounted on either end of the machine.

The main drive clutch is of the heavy multiple-disc type and is easily adjusted without tools. Usual brake troubles are eliminated by using a clutch, that is a duplicate of the main clutch, for braking.

Bending, forming, blanking, drawing and multiple-punching operations may be performed on Steelweld presses.



The Cleveland Crane & Engineering Co., Steelweld Machinery Div., Dept. J-6, Wickliffe, O., will send detailed information upon request.

PRODUCE FOR VICTORY!
Enlist
WITTEK
Automatic
ROLL FEEDS AND REEL STANDS
Wittek Automatic Roll Feeds and Reel Stands provide improved and simplified methods of punch press operation. They are easily mounted on any make or size punch press and assure fast, safe and accurate feeding under all conditions. Wittek Roll Feeds are made in four different types to meet all automatic feeding requirements.
Write for Descriptive Catalog
WITTEK MANUFACTURING CO.
4305-15 West 24th Place, Chicago, Illinois

Improved Efficiency With Individual Motor Drive

THE present trend toward individual drive for modern machine tools has resulted in a demand for a unit to modernize older types of machine tools already installed and in most instances group driven. The Robbins and Myers Machine Tool Drive eliminates expensive and complex line shafting with attendant bearing, lubricating and belting problems. Overhead lighting and appearance is improved by the elimination of unsightly shafting and belting. The use of individual drive and control saves floor space and gives greater flexibility of machine operation. Efficiency is improved by using individual drive on machines operated infrequently or for short periods when other machines in the group are operated continuously. The installation is simple as only four holes are required for mounting.

Specifications of the motor are: 220-440 volt; 3-phase; 60 cycle induction type. It meets every NEMA standard. The gears are of high grade steel, heat treated. The edges are rounded to insure smooth, easy shifting. All gears run continuously in a bath of oil.

R & M Machine Tool Drives are guaranteed for one year from date of shipment from the factory against defects in material and workmanship, provided the company receives immediate written notice of such defects.

Circular No. 1793-A can be obtained by writing Robbins and Myers, Inc., Dept. 6J, Springfield, O. All essential information about R & M drives is contained in this circular.

Our Contract Tool and Die Shops will be glad to make an estimate. Try them. Pages 124-125.

Eliminates Costly Set-ups

Example No. 3

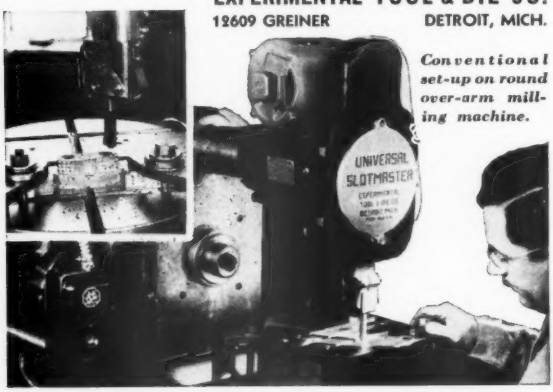
Intricately shaped chuck jaw teeth can be cut using only one set-up with a SLOTMASTER . . . The jaws are chucked on a rotating table on a milling machine — a slotting tool is ground to the shape required and inserted in the clapper box tool holder . . . When one row of teeth is completed — the work is indexed to the next position, and so on, until the job is finished . . . Any other method would require several costly, cumbersome set-ups and it would be difficult to maintain accuracy.

SLOTMASTER can be used on milling machines and provides double duty facilities at a minimum cost. It requires but little time to change-over from one head to the other . . . The stroke of the ram is adjustable from 0 to 4" . . . the speeds range from 50 to 250 s. p. m. . . . The tool holder, of the clapper box type, can be turned in any position . . . All of the working parts are of tool steel heat treated and ground to close tolerances . . . SLOTMASTER comes complete with pulleys, motor, belt and mounting adaptable to round over-arm or flat-on-round over-arm milling machines.

Send for 4-page catalog and give the specifications of the milling machines that you wish to equip. Immediate deliveries on high priorities.

EXPERIMENTAL TOOL & DIE CO.

12609 GREINER DETROIT, MICH.



Conventional set-up on round over-arm milling machine.

Speed and Durability for Long, Hard Service

THE Jefferson Motor Driven Precision Milling Machine, it is claimed, has been proven economical for such operations as die sinking, contour profiling, angular milling jig boring, routing of ferrous and non-ferrous metals and practically all other essential milling operations.

The spindle is mounted in tapered Timken Roller Bearings and the slides are dove-tailed, gibbed and hand scraped to perfect alignment. The power feed is furnished with adjustable positive automatic stop.

The table of the Jefferson Milling Machine has an equal capacity to that of many larger milling machines and is equipped with three T-slots for tightly clamping work or fixtures.

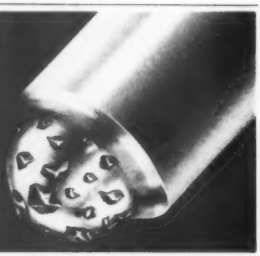
All feed screws have been minutely and accurately machine threaded—these screws having dials which are graduated in thousandths of an inch. The vertical feed screw is operated by bevel gears with a ratio of 1/1. The power feed has a 3-step V-belt drive for each spindle speed.

The Jefferson Milling Machine is so constructed that it is at all times ready for the application of a variety of standard attachments. It can be furnished with coolant pump and tank, concealed in a larger base easily accessible through a door.

The Jefferson Machine Tool Co., 710 N. W. Fourth St., Cincinnati, O., will furnish additional information upon request.

"Better Gage Design Saves Man-Hours" by I. A. Hunt is a well written article which should be read by all who are interested in saving time—time badly needed for our Victory Program. Pages 38-74.

IMMEDIATE DELIVERY OF THESE *DIAMOND DRESSERS*



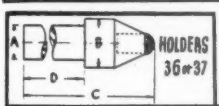
Carboloy Diamond Dressers are in stock ready for immediate delivery in eight most commonly used types of holders.

You get this prompt service plus these cost-saving features: No resetting—no lost diamonds—up to 90% diamond utilization—stands unusual abuse—saves at least 25% in annual dresser costs.

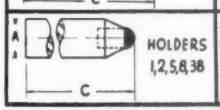
Complete ordering data below—or send for Catalog DR-100.

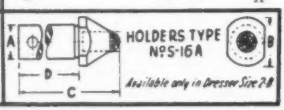
Grinding Wheel Diameter	Grinding Wheel Width	Correct Dresser	Price Each
Up to 20"	Up to 1½"	2-B	$ 9.60
Up to 26"	Up to 2½"	3-C	12.60
Up to 42"	Up to 8"	4-D	15.35

Mounted Free in Desired Holder. Standard Holders shown below. Special types when needed.



Holder Number	1	2	5	8	36	37	38	S-16-A
A	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16
B					3/16	3/16		3/16
C	1 1/16	1 1/16	4	1 1/16	2 1/16	2 1/16	3 1/16	1 1/16
D					1 1/16	1 1/16		33/64



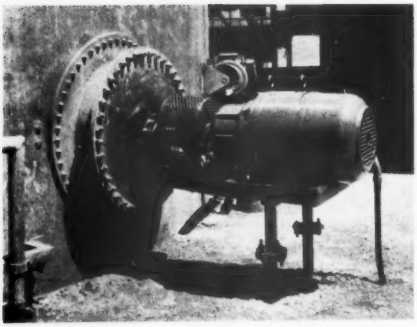


CARBOLOY COMPANY, INC.
11109 E. 8 Mile Blvd., Detroit, Mich.

Chicago, Cleveland, Los Angeles, Newark, Philadelphia, Pittsburgh, Worcester, Mass.

CARBOLOY Diamond Impregnated WHEEL DRESSERS

Mixing Operations Speeded for War Production



THE Eastern Engineering Company, makers of industrial mixing equipment, is now concentrating its efforts on War Production work by helping manufacturers to speed up their mixing operations.

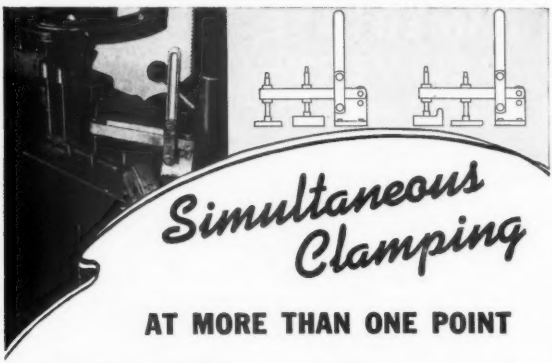
The illustration shows side-entering mixers on a half million gallon blending tank. The motor used on this job is a 10 hp, 400 rpm gearhead explosion proof heavy duty type for continuous operation. Two propellers are mounted on the shaft which extends through the stuffing box into the tank.

The stuffing box consists of two sets of asbestos packing, both adjusted for sealing tension from outside the tank. Between the two packings are a lantern ring grease retainer and a precision ball bearing.

The unit is mounted on a heavy cast iron base suitably ribbed for strength. The base and stuffing box flanges are pinned and bolted together to assure perfect alignment between the motor and the stuffing box.

Models of this type can be furnished in sizes from 1/20 hp to 50 hp for operations on tanks up to 100,000 barrel capacity. Metal coming in contact with the liquid can be furnished in bronze, cast iron, stainless steel, monel metal, Hastelloy "C" or other corrosive resisting alloys.

For descriptive literature address Eastern Engineering Co., 43 Fox St., New Haven, Conn.



AT MORE THAN ONE POINT

One clamping operation can now hold several pieces at one time regardless of thickness or shape. A new model Knu-Vise Toggle-Action Clamp (No. KV-195) makes this possible. Its U-shaped toggle arm permits the quick insertion and adjustment—horizontally or vertically—of pressure pads at one or more points. The same setup remains uniformly fixed for entire job. Many motions are thus eliminated, and much time is saved. One flip of lever either clamps or releases. Applied pressure ratio is in excess of 40 to 1.

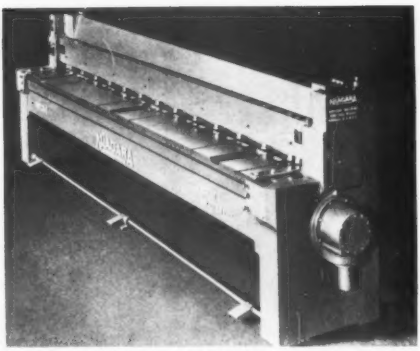
If you have any clamping operations, perhaps we can show you some shortcuts to save time and speed production.

KNU-VISE
INCORPORATED

16877 Hamilton Ave. Detroit, Mich.
4328 San Fernando Rd. Glendale, Calif.

Down Time Cut with Power Shears

THE Niagara Machine & Tool Works announces the addition of a new line of Series No. 3 Power Squaring Shears. Many new and exclusive improvements, it is claimed, result in new standards of shearing accuracy, high production and freedom from costly down time.



The advanced design makes possible the cutting of sheared edges and narrow strips that are straight and parallel to within a very few thousandths of an inch.

The Power Squaring Shears operate at a speed of 80 strokes per minute. High production squaring and trimming is also assured by the instant acting Niagara sleeve clutch, quick acting ball bearing, self measuring back gage, convenient operation of the machine, and reduction of fatigue in handling sheets and off-cut material.

Drive mechanism, including flywheel, gearing, clutch, eccentrics and connections, is enclosed and operates in oil. This assures long life, low maintenance cost and utmost safety.

Series No. 3 Shears are built in 4′ to 12′ cutting lengths with capacities from 14 to 18 gage.

Specifications are available by writing The Niagara Machine & Tool Works, Buffalo, N. Y., or to The TOOL & DIE Journal.

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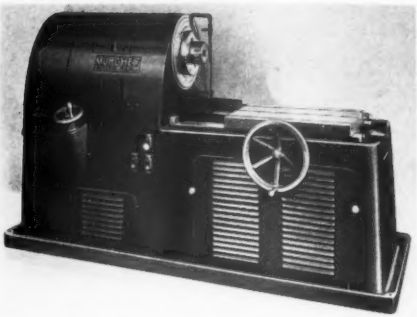
THE LAKESIDE STEEL IMPROVEMENT CO.
5418 Lakeside Avenue CLEVELAND, OHIO Phone Henderson 9100

Mass Production Thread Miller Offered



THE Murchey Thread Milling Machine is intended for the mass production of right or left hand internal or external threads. It will handle work from 1" to 4" diameter, inclusive, 3" long and up to 1½" pitch by means of annular milling cutters covering the full length of the thread.

The bed is of semi-steel casting of heavy box type construction, assuring great rigidity and providing an enclosed space for the motors, flexible pulley unit, the hydraulic and coolant systems.

The fixture table, 30" in length, slides on dovetail ways. Adjusting tapered gibs run the full length of the table. The adjustable gibs and all moving parts are made of hardened and ground alloy steel, working on scraped surfaces of nickel iron.

The head stock is a substantial unit rigidly secured to the bed of the machine. Within the head stock is contained the spindle, eccentric spindle sleeves, lead screw, segmental lead nuts and lead head.

After adjusting the machine for proper thread diameter and thread depth, the complete working cycle is automatic. The work is chucked, the machine started and then the complete cycle is carried through without manual assistance. It may be stopped, however, at any point in the cutting cycle.

Detailed information may be obtained by writing Murchey Machine & Tool Co., 951-B Porter St., Detroit, Mich.

FLATNESS and SMOOTHNESS
of Production Parts
The Ultra-Lap machine will finish your parts to a flatness of one light band or less . . . to a smoothness as low as one micro-inch R.M.S., any metal or material. Much faster, more uniform than hand method. Machine designed for you or we shall be pleased to lap your parts on a job basis. Ultra-Lap machines and service used by aircraft and many other war-time industries.
Ultra-Lap MACHINE COMPANY
245 McDOUGALL AVE. · DETROIT, MICH.

Improved Marking Device Eliminates Spalling

FOR years plants and factories have striven to increase safety in all phases of their production. This word "safety" has become a symbol in both personal and business life. With that goal always in mind, the M. E. Cunningham Co. has been developing and improving stamping methods to make possible more safety and more service.

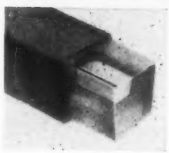
This goal has been accomplished largely through the use of a patented alloy steel which eliminates spalling and mushrooming.

One marking device made by the Cunningham Co. (illustrated at right) is the Safety Box Type Holder. This is a universal holder which is applicable to operations previously using hand or sledge holders. It has recently been designed to give faster and more efficient marking on hot or cold, and on flat, round or angular surfaces. It also is made for any size or number of characters. It is constructed with a sleeve which levels or holds the "floating" type holder at right angles on the object to be marked, assuring clear, even impressions.

The steel type also "floats" within the type holder. Because both the holder and type are held loosely in place, a dual leveling action takes place when the holder is struck with a hammer. The outside sleeve provides an exclusive safety feature in preventing any scale or broken pieces of type flying out of the holder.

Illustrated literature will be furnished on request. Address M. E. Cunningham Co., 113 E. Carson St., Pittsburgh, Pa.

NOT JUST "How Fast?" BUT "HOW FAST and HOW well?"



STYLE NO. 6

you get *BOTH* SPEED and ACCURACY with KENNAMETAL

■ In armament plants throughout the country . . . on all types of jobs, KENNAMETAL steel-cutting carbide tools are increasing both machining speeds and accuracy. KENNAMETAL tools machine steels in hardnesses up to 550 Brinell at speeds 2 to 6 times faster than are possible with high speed steel tools—and the greater hardness of KENNAMETAL permits such accurate machining that roughing and finishing often can be combined into one cut.

Find out how KENNAMETAL is increasing production of planes, guns, tanks and ships . . . find out how it can help you in your machine shop. Write for complete information.

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Invented and manufactured in U. S. A.

McKENNA METALS Co.

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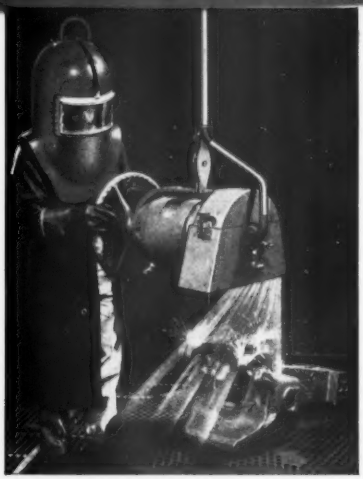
Foreign Sales: U. S. STEEL EXPORT CO., 30 Church St., New York
Exclusive of Canada and Great Britain



Airless Abrasive Blast Cleaning

A PORTABLE Wheelabrator for the blast room—an entirely new development in the field of airless abrasive blast cleaning—has been announced by American Foundry Equipment Co.

Being airless, the new blast unit eliminates such equipment as: air compressor motors, pressure tanks, mixing chambers, air receivers, piping hose, valves and nozzles.

It is claimed that the Portable Wheelabrator has been successfully applied to the cleaning of a wide range of large and small intricate, irregular shaped work such as that handled in jobbing shops or where the daily production of various parts does not warrant the use of special equipment. Typical applications would include such work as: lathe beds, flywheels, gears, pulleys, valves, car wheels, frames and housings.

The portable Wheelabrator has complete flexibility of movement to any position—high or low—in any direction, and to any part of the blast room.

Brief Specifications: *Electric Motor* (direct connected) — 2 hp, 3 phase, 60 cycle, AC 3600 rpm; *Overall Dimensions* — length 26″; diameter of motor housing 12″; maximum width of Wheelabrator housing 18″; diameter of handwheel 17″; *Amount of Abrasive Handled* per minute—approximately 70 lbs. at normal rated capacity; *Net Weight* — approximately 230 lbs.

Literature is available. Write American Foundry Equipment Co., 553 S. Byrkit St., Mishawaka, Ind. Ask for Bulletin 54.

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SPRING PROBLEMS
● If you need special design, special quality or special delivery, the chances are we can help you. Redesign may modify costs, too. This specialized organization, recognized headquarters for all that is latest and best in spring making, is at your service.
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WM. D. GIBSON CO.
1800 Clybourn Ave.
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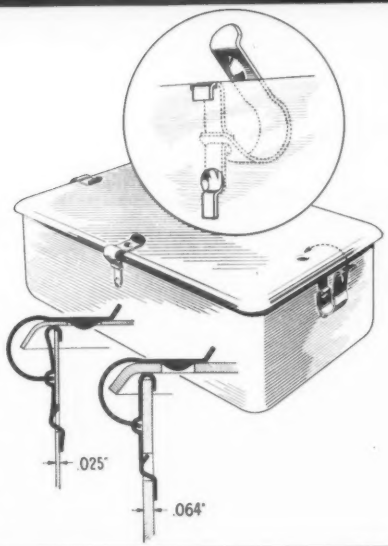
(Div. Assoc. Spring Corp.)
65 Years of Knowing How RESULTS IN BETTER SPRINGS
GIBSON-SPRINGS
INQUIRIES INVITED . . . LARGE ORDERS . . . SMALL

New Speed Clip Saves Time

JUNCTION box covers may now be attached in less than one-fourth the usual time without the use of bolts, rivets, nuts or tools of any kind.

The new and faster method is with an ingenious, two piece Speed Clip that can be snapped by hand into holes in the sides of boxes or other enclosures. It is so constructed that it can be used universally on boxes ranging from .025" to .064" in thickness. Similar Speed Clips for thicker material are also available.

Both parts of the clip are made of high carbon spring steel. One part snaps into a hole in the side of a junction box while the second part hinges on the first and has an integrally formed dimple on the end which snaps into a hole or mated dimple in the box cover.



With these new Speed Clips, covers are locked to boxes with a firm spring tension but can be instantly removed or attached without the use of any tools. Junction boxes now in use can be adapted to these new fasteners by merely drilling and notching as required.

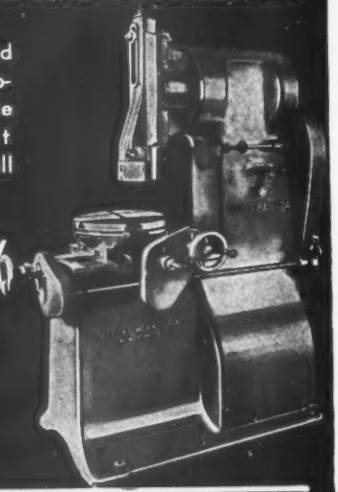
Besides the advantages mentioned, it is reported that this new Speed Clip No. 5928 saves more than 80 percent of any former cost.

For descriptive literature on the new Junction Box Clip No. 5928, address Tinnerman Products, Inc., 2095-A Fulton Rd., Cleveland, Ohio.

Douglas PRECISION SLOTTER

FOR TOOLROOM AND PRODUCTION

Swiveling ram head and tool holder, automatic circular table and independent automatic feeds in all directions.



Prompt Delivery by Large-Scale Production

Built with 7", 8", 10" Stroke

DOUGLAS MACHINERY CO., INC.

150 BROADWAY, NEW YORK, N. Y., Dept. 20-F

PRECISION BORING and SPOTFACING

—with fewer motions in less time

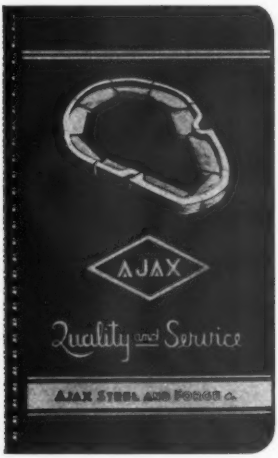
The B&B SPOTFACER AND BORING TOOL is one of the most versatile, indispensable, and efficient tools any tool shop can possess. In this device are many tools in one—with every application designed for precision work and speed. Boring diameters range up to 22 inches, within 0.0001 inch. Micrometer adjustment in head.

Wide range of spotfacing also offered. The B&B always produces bottoms of holes that are flat and square to sidewalls. Adapters are provided for boring small holes and also inverted and long holes.

Let us send you folder E341 which gives more detailed information about this distinctive tool.

BOKUM TOOL CO.

49 W. Hancock Ave. Detroit, Mich.



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205 ADAIR STREET DETROIT, MICHIGAN

Faster Holding and Indexing

THE Zagar Collet Chucking Fixture is designed for use on any standard milling machine, drill press or lathe.

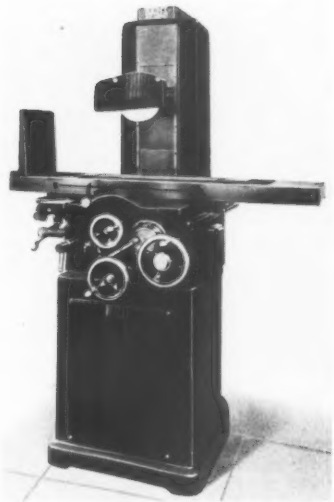
The collet is entered from the base side to ride inside a tapered ring at the nose. This ring is connected by eccentrics on the two sides. The eccentrics pass through a cylindrical member that rotates inside a sleeve secured to the base. A removable index plate can be applied for any index division to 25.

An opening through the screw permits coolants to flood upward to lubricate the work and clean out chips. The assembly is completed by a fork operated lever that connects to the eccentrics to rotate them for clamping or release.

The 1" and 2" holding fixtures are 4½" high with a 6" diameter at the base and 5¾" high with a 7½" diameter at the base respectively.

All parts are made of steel, hardened and ground to finish dimensions. These small tools are all comparatively easy to get, require little setup and can be operated by any available labor. With the Zagar Collet Fixture for holding, second operations may be held fast and accurately with little or no time lost in the extra handling.

Additional information can be obtained from Zagar Tool, Inc., 23881 Lakeland Blvd., Cleveland, O.



#2 AUTOMATIC PRECISION TYPE SURFACE GRINDER

capacity 6" x 12" x 18"

PROMPT DELIVERIES

ATLANTIC MACHINERY CORPORATION

149 Broadway, New York, N. Y.

Cabinet Safeguards Tools From Moisture

TOOLS, dies and gages can now be protected against the effects of excess moisture by a new cabinet type dehumidifier. The "Dry-Cabinet" is said to keep air dry, clean and wholesome, prevent mold, mildew and dampness and reduce their attendant odors.

The excess moisture is absorbed from air by the Water-Sorber dehydrating chemical cubes. Circulation of dry air throughout the cabinet is provided by a flue that runs up both sides to the top of the chemical unit. Built to provide ample and convenient storage space, the cabinet is of wood, 34" high, 38" wide and 14" deep.

Also available are Water-Sorber units, in several sizes and models for use in spaces and buildings where infiltration is at a minimum. These units meet many requirements for low cost humidity control in tool rooms and research laboratories.

This equipment is designed by engineers with wide experience in air conditioning problems. A photograph of the Water-Sorber "Dry-Cabinet" is shown above.

For further information regarding either the "Dry-Cabinet" or the Water-Sorber units, write directly to the General Air Conditioning Corp., 4427 Appleton St., Cincinnati, O.

all DOWN-HAND welding with just ONE set-up

regardless of size or shape

● With convenient push-button control in one hand and rod in the other the welder is taking advantage of two important features of C-F Positioners; tilting to the proper angle for down-hand welding and using variable speed rotation for laying the fillet. One "set-up" on the machine positions this circular weldment *or any size or shape* of assembly for *all* down-hand welding. This kind of "production-line" welding is faster, safer and better and there are C-F Positioners to accommodate weldments from 1,200 to 14,000 lbs.

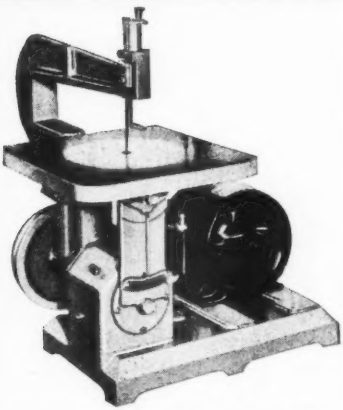
CULLEN-FRIESTEDT CO.,
1376 S. KILBOURN AVE. CHICAGO, ILLINOIS

Looking for that practical, authoritative book for home and shop? Then turn to pages 106-108.

Bottlenecks Eliminated

IMMEDIATE DELIVERY

Atlas Die Filing Machines



Can be used for all kinds of die making. The overarm is constructed so that the file and saw attachments may be interchanged with little effort. The holddown fingers are attached directly to the overarm. Working surface of the table, which tilts two directions, is entirely clear. An improved type of chuck, consisting of movable hardened jaws, holds both saws and files. Screw adjustment makes changes easy and fast.

The ATLAS Die-Filing Machine has every possible advantage for rapid and accurate diemaking — AT A BIG SAVING OF LABOR.

Price, complete with motor — **$125.00** Net
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101 S. Clinton St. Chicago, Ill.

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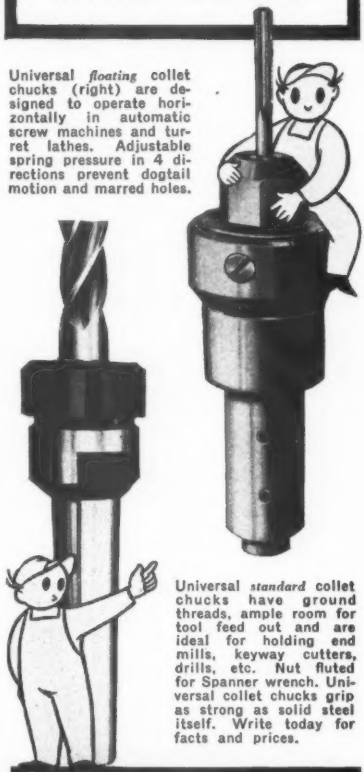
Detroit Distributor
International Machinery Co.
3131 E. Jefferson Ave. Detroit, Mich.

Morrison Machine Products Division Discontinued

Morrison Machine Products Division of Hardinge Brothers, Inc., Elmira, New York, has been discontinued. Their products become a part of the Hardinge line.

UNIVERSAL
COLLET CHUCKS FOR ACCURACY AND SPEED

Universal *floating* collet chucks (right) are designed to operate horizontally in automatic screw machines and turret lathes. Adjustable spring pressure in 4 directions prevent dogtail motion and marred holes.



Universal *standard* collet chucks have ground threads, ample room for tool feed out and are ideal for holding end mills, keyway cutters, drills, etc. Nut fluted for Spanner wrench. Universal collet chucks grip as strong as solid steel itself. Write today for facts and prices.

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Frankenmuth, Mich.

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Here's a service born of the war—literally made to order for concerns now doing war work—about to begin doing war work—or who want to get into war work.

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If any of these are your problems, let us show you how we solve them for some of the biggest concerns in the world.

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For AIRCRAFT PARTS PRODUCTION!

Boring, End-Milling and Slotting on shackles and similar production parts finished faster on the Holland.

Holland

8" x 16" VERTICAL MILLING MACHINE

This rugged miller is widely used in aircraft and armament plants, as well as toolrooms. The high-speed head, a self-contained motor-driven unit, can be turned to any angle parallel with the longitudinal feed. Compact design, with extra large handles and convenient controls, make the Holland Miller ideal for small parts such as the shackle shown above.

Chrome-plated quill has lever feed. Large feed dials for easy reading. Spindle mounted on precision preloaded ball bearings.

Specifications: Table Size 8" x 26", Table Range 8" x 16", Vertical Feeds 3" on Quill, 8" on Quill Head; Collet Capacity ½". Swivel Head graduated to 90° left and right. Dial Graduations in .001".

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KEEP PRODUCTION UP
with DURO Slow Speed
DRILL PRESSES

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America is depending on you. Use dependable Duro Presses that will keep your production rolling. Ask for complete details.

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Reg. U. S. Pat. Off.

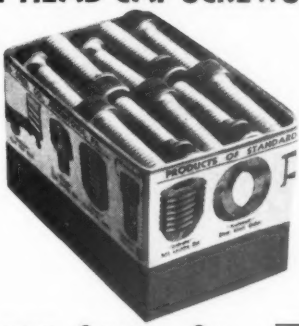
UNBRAKO

Knurled SOCKET HEAD CAP SCREWS

The Knurled head has that non-skid grip which gives *a much better purchase*, regardless of grease or oil . . . a real time saver.

And . . . "Unbrako" costs no more than ordinary cap screws.

Deliveries are better than average. Write for full details today.



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— BRANCHES —
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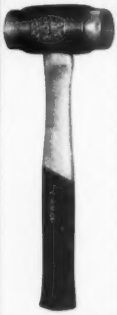
The Knurling of Socket Screws originated with "Unbrako" years ago.

Rawhide HAMMERS *Rawhide* MALLETS



• Genuine Java Water Buffalo Hide replaceable faces in malleable head.

No.	Dia. in ins.	Wgt. in lbs.
0	1	½
1	1¼	1⅛
2	1½	1⅝
3	1¾	2¼
4	2	4
5	2¾	5½

• A finely balanced Tool with tough, resilient Java Water Buffalo Rawhide heads.

Not Loaded				Loaded Mallets			
No.	Dia. Ins.	Lgt. Ins.	Wt. Ozs.	No.	Dia. Ins.	Lgt. Ins.	Wt. Ozs.
0	1	2⅛	2	7	1¼	3	8
1	1¼	3	3½	8	1½	3⅛	12
2	1½	3¼	6	9	1¾	3¾	16
3	1¾	3¼	7½	10	2	3½	20
4	2	3½	10	11	2¾	4¼	42
5	2¾	4¼	21				
6	2¾	4¾	23				

• These are the tough, resilient, long-lasting Rawhide faces made from specially treated Java Water Buffalo hide for use in Chicago Rawhide Hammers.

CHICAGO *Rawhide* MFG. CO.

1280 ELSTON AVE.. ★ CHICAGO, ILLINOIS.

BARTELT
TOOL SETTING GAUGE

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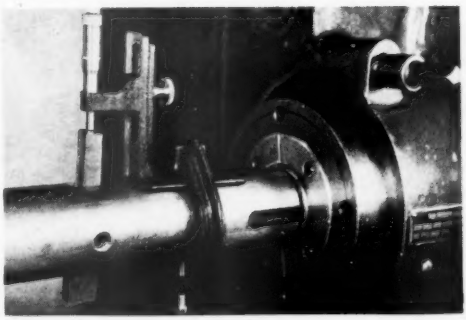
Designed for speedy, accurate setting of boring tools and many other tool setting applications. Saves time, labor and costly errors.

A model with a dial indicator instead of micrometer is also available.

Send for illustrated literature.



USES: Setting cutting tools in boring bars—Milling machine set up—Planer set up—As a height gauge—As a depth gauge—Layout and inspection.

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1214 Partridge Avenue - - BELOIT, WISCONSIN

PRECISION GAGE MAKERS

Continuous special training of skilled craftsmen assures the finest precision work to meet the most rigid specifications of leading users of precision gages, gaging fixtures and small stamping dies.
We have designed and built special gages of every type and description for a number of leading production manufacturers. Our facilities for designing and making precision gages and dies are among the best.

May we quote on your gage and gaging fixture requirements?

TOOLS & GAGES, INC.

3112 East 63rd Street **Cleveland, Ohio**

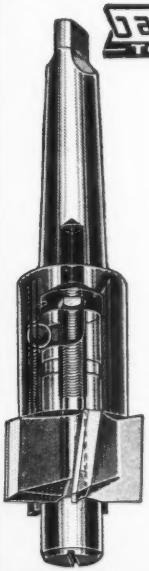
Gairing TOOLS

Counterbore Sets

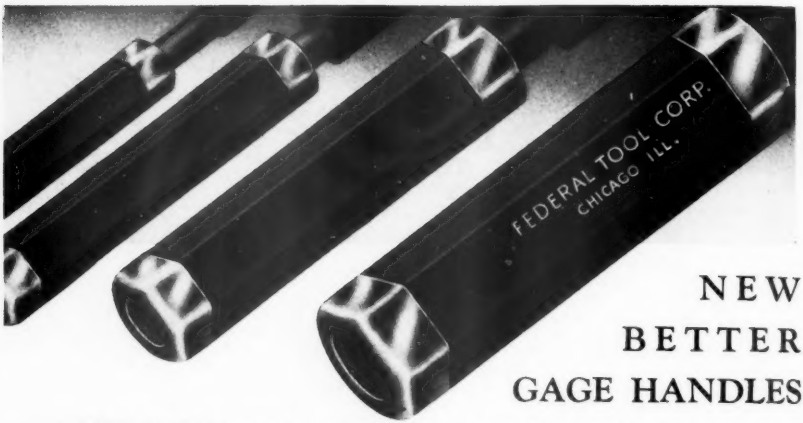
These handy Gairing kits speed production on all counterboring and spotfacing operations. Available in seven sets containing a neatly boxed assortment of interchangeable counterbores, pilots and holders. *Write today for prices and literature.*

THE GAIRING TOOL CO., Detroit, Michigan

For a quarter century specialists in fine cutting tools.



This set consists of one holder, counterbores from ⅜" to 1⅛", pilots from ¼" to⅞" and countersinks ⅞" dia.—70° and 82°.



NEW
BETTER
GAGE HANDLES

ACCURATELY made of plastic material to the accepted standard dimensions. Lighter in weight . . . much lighter than aluminum or other metals used for Gage handles. They will do the same job . . . better and the metal is saved for other uses. The cost is surprisingly low.

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MAC-IT
Quality Steel Screws
In some applications, regular cap screws may not provide the desired holding power or margin of safety.
Mac-it hex head cap screws, milled from the bar and heat-treated, have the strength needed for these extra tough jobs.
OTHER MAC-IT PRODUCTS INCLUDE:
SOCKET HEAD CAP SCREWS
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THE STRONG, CARLISLE & HAMMOND COMPANY
1392 West Third St., Cleveland · Ohio

FOR QUICKER SETTING STREAMLINED PERFORMANCE

EVERY tool and die man knows that one of the most troublesome and inaccurate tools that he must work with is the filing machine. This is due to crooked file shanks which bend off at a different angle from the file itself during the hardening process. As a result, in a great many cases it is almost impossible to impart an absolutely true vertical motion to the file.

All of these troubles have been solved by the Industrial All American Filing Machine. This machine, with its Universal Joint File Clamp, makes it possible, in a few moments, to set the file absolutely square with the table and enables you to do work of utmost accuracy.

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Industrial Engineering Co., Inc.

141 W. Jackson Blvd. Chicago, Ill.

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Stand for Quality

We were the Originators of HIGH CARBON-HIGH CHROME Steels with NON-DEFORMING Qualities, opening the way to

Quantity Production

for all kinds of Dies and Press Tools with High Carbon-High Chrome Steel

Oil-Hardening
"NEOR"

and

Air-Hardening
"COBALTCROM-PRK"
—the latter also in CAST FORM

have become the STANDARD on which all subsequent similar kinds of Steel were based.

We supply also

High Speed Steels

in Bars, Forgings, Tool-Bits as well as all types of

High Grade Tool Steels

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WELDING RODS
Save time and money in die repair or tool redesigning as used in Precision-Welding.

Full particulars on request

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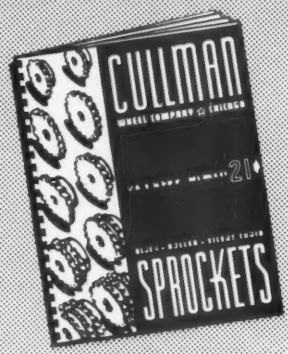

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If you use sprockets, you should have this handy reference book of CULLMAN SPROCKETS.

It lists thousands of stock sizes and styles and explains how to select the sprocket most suitable for your purpose.

Write for your copy NOW.

OVER 50,000
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CULLMAN WHEEL CO.
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Boyar-Schultz Profile Grinder No. 1

For grinding and fitting dies and punches, grinding die clearances, and grinding cams and templates to scribed lines.

In many instances this Grinder is used to correct dies for changes in piece parts and also to repair damaged or broken dies. This is done without annealing and re-hardening the dies, thus preventing the warpage that might render the whole job worthless.

One of this grinder's advantages is its high spindle speed of 20,000 R. P. M. This high speed permits using small diameter wheels in confined openings and small radii.

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2112-G Walnut Street Chicago, Illinois

Filing for Victory

Oliver Die Making Machines are fast and efficient on all sawing and filing operations. They save 50% to 60% of the labor over hand methods in the cost of making precision Dies, Gages, Cams, Templates and similar products requiring rapid and accurate sawing, filing and lapping operations.

It will pay you to investigate the line of Oliver Die Making Machines!

SEND FOR LITERATURE

We also build Drill Grinders, Tool and Cutter Grinders, Face Mill Grinders, Template Tool Bit Grinders.

OLIVER INSTRUMENT CO.

1436 Maumee St., E. Adrian, Mich.

Fleetwood Offers Specialized War-Time Engineering Service

FROM Detroit comes the announcement of the organization of the Fleetwood Engineering Co., with Robert F. Williams as general manager.

The whole idea behind this organization is to offer a specialized war-time engineering service to manufacturers who need the help of a staff thoroughly familiar with every step necessary in executing government contracts.

The key men in the Fleetwood Engineering Co. have all played an important part in the war effort—ever since this country decided to become the arsenal of democracy. They have been concerned not only with the actual tooling and manufacturing phases, but also with the securing of contracts and the swift conversion of plants to war-time efficiency.

How to get started in war work—how to proceed with certainty through the maze of details which the layman calls "government red tape"—these are problems which sometimes hold more terrors for the uninitiated than the actual manufacture of the goods themselves.

Fleetwood service is available in such capacities as contract survey and consultation, plant layout, processing, tool design, time study, tool and materials control, industrial organization, tool set ups and trouble shooting, tool, jig and fixture inspection and purchasing, product designing and engineering.

As Mr. Williams expresses it, perhaps the term "Engineering" is too limited to define the complete service which Fleetwood offers. They want to help two kinds of war-time businesses — those which are having trouble — and those which want to avoid it.

Detailed information may be had by writing Robert F. Williams, General Manager, Fleetwood Engineering Co., 12 E. Hancock Ave., Detroit, Mich.

Gripping Power Maintained for Life

THE line of Holland Vises—the result of over 50 years' experience, are strong, rigid and durable.

Wide bearings and long body construction insure rigidity and durability and liberal depth of jaw gives ample capacity for work within range of size. Welded tool steel jaw faces, machine corrugated, will not loosen or lose their gripping power during life of the vise. Large machine finished bearings between screw head and collar prevent lost motion. A heavy malleable nut is aligned and fitted so that screws will not bind.

Holland Mfg. Co., Dept. HV, Erie, Pa., will send further details.

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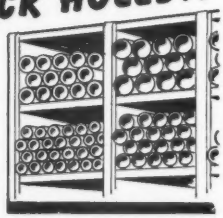
BUT WE DON'T SELL THEM!



Learn the economy of buying BISCO Tool Steel Tubing! You can realize genuine savings by using tubes for ring dies, bushings, spacers, etc. No machining waste necessary. Your requirements cut to specifications—you pay only for what you use.

Free Catalog On Request

Tool Bits Available for Immediate Delivery

TRU-CUT tool bits are designed and especially heat treated for machining tough steels. Four types of tools are available. HSS-"C" and HSS-"T" are made for regular machining operations. "Blue Nose" tools are designed for cutting mild steels, alloys and tool steels, while "Gold Tip" tools are specially adapted for cutting harder materials at somewhat slower speed than "Blue Nose".

These tool bits pass through five heat treating operations providing a Rockwell "C" 65-66, but still retain their toughness. They fill the gap between regular high speed and carbides and are particularly applicable where intermittent cuts or heavy boring are necessary. While the tools are run at slower speeds, deeper cuts and greater feed are possible.

A descriptive booklet describes and lists available sizes and prices. A copy will be sent on request to Tru-Cut Tool Co., 5922 Second Blvd., Detroit, Mich.

Eliminate Hand Operations

With Portable Electric Filing and Honing Tool
(Reciprocating Action)
For Tool, Die, Mold and Machine Shops

AVAILABLE IN TWO MODELS
Senior in Two Strokes 3/8" and 1/8"
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Mechanically reproduces the natural push and pull action of hand operations in filing, honing, polishing, sanding, sawing, etc., when equipped with proper accessory.

Prompt Delivery from Stock

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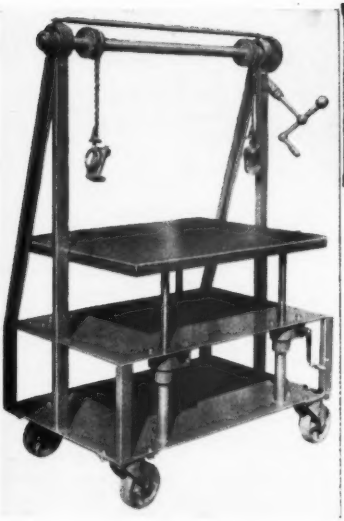

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with this new
DIE TRUCK

One man alone can handle the heavy job of moving dies from storage racks to press with this new die truck. Adjustable table lifts from 24″ above floor to 40″ above. Features faster table travel; adjustable sliding spools on keyed shaft; and adjustable cast steel punch holder clamps. Truck is easier rolling. Table provides more working room and also can be used as a practical work bench.

★ 10-Day Delivery If Priority Is Furnished. Write or Telephone.

MODERN MOTOR DRIVES, INC.
ELKHART, INDIANA

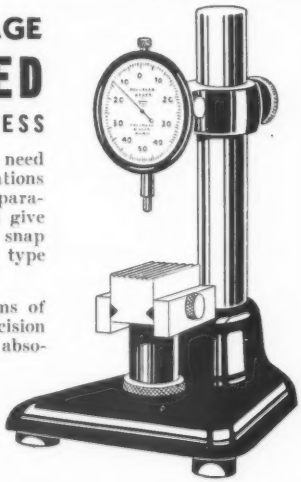
DEALERS: *some territory still available*

COMPARATOR and SNAP GAGE
ANVILS RESURFACED
by the ACME FLAT LAPPING PROCESS

★Gage blocks and anvils, (serrated or plain), need frequent check-ups to detect the surface deviations caused by local wear. To insure that your comparators, gages and other measuring instruments will give *accurate* readings, send your comparator and snap gage tables, anvils, or other flat contacts of any type or style, to Acme for refinishing.

Because Acme is equipped to measure in terms of micro-inches, and experienced in extreme precision manufacture, surfaces can be finished to as near absolute flatness as your requirements dictate.

Be sure your measuring instrument anvils are accurate. Send them with any other *flat* parts to Acme for resurfacing today.



ACME

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Makers of Hardened and Ground Precision Parts
206 N. Laflin St. Chicago, Ill. MONroe 4122

SHOP AIDS

SCHAUER SPEED LATHE CATALOG—An attractive 24-page catalog has recently been made available by the Schauer Machine Co., 2076 Reading Rd., Cincinnati, O. Schauer Catalog No. 420 gives buyers a quick reference to vital information relative to the Ideal line of Speed Lathes.

Beginning with the basic construction of lathes, the catalog lists seven types available. Special applications designed for many different finishing, polishing, lapping and burring operations are illustrated. Write for your Schauer Catalog No. 420 today.

METALLURGY—The first edition of this book went through three printings. The same basic plan of stressing physical rather than chemical metallurgy has been followed in this enlarged and revised book.

The text is recommended for those who are working in industry and who want some general knowledge of why metals behave as they do. The contents cover: properties of metals and tests to determine their use; chemical metallurgy; producing iron and steel; physical metallurgy; shaping and forming metals; commercially important nonferrous alloys; copper and its alloys; heat treatment for steel; surface treatments; alloy or special steels; classification of steels; powder metallurgy and literature of metallurgy.

The author is Carl G. Johnson of the Worcester Polytechnic Institute. "Metallurgy" can be obtained by writing The TOOL & DIE Journal. Price, $2.50.

PLANT PRODUCTION CONTROL—This book deals with the maximum production of goods with the minimum confusion and expense. No one system is advocated but rather an attempt is made to resolve the problems into the functions which are necessary for controlling production in most any situation. Production control is broken down into several functions. Each function is treated separately, yet coordinated with the others to show how control of production is obtained. This 510-page book, written by C. A. Koepke, Professor of Industrial Engineering, University of Minnesota, can be obtained by writing The TOOL & DIE Journal. Price, $4.00.

TECHNIDATA HAND BOOK—is a condensed classified summary of the usable information on the fundamental exact sciences. Data scattered in many places is here all combined for quick, easy references. Written by Edward L. Page and published by the Norman W. Henley Publishing Co. Orders should be directed to The TOOL & DIE Journal, 2460 Fairmount Blvd., Cleveland, O. Price, $1.00.

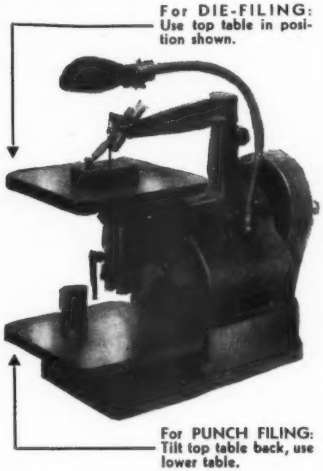
MANUFACTURING PROCESSES—This book is written primarily for engineering students and includes the technical fundamentals of important manufacturing processes, engineering materials and modern equipment necessary for processing these materials.

Approximately fifty percent of the book is devoted to the subjects of foundry practice, pattern work, metal castings, plastics molding, heat treatment and welding. The latter half of the book takes up production machines, accessories, cutting tools and measuring instruments.

Photographs of many modern machine tools and manufacturing processes have been included, as well as numerous line diagrams illustrating machines and principles. The author is Myron L. Begeman, Professor of Mechanical Engineering, University of Texas. Price, $4.50. Direct orders to The TOOL & DIE Journal, 2460 Fairmount Blvd., Cleveland, O.

For

MACHINE FILING and LAPPING OF OTHERWISE INACCESSIBLE JOBS . . .



This dual-purpose machine eliminates the necessity for hand-filing on intricate jobs or otherwise inaccessible parts. With fully adjustable stroke from 0 to 1½", and two speeds, this universal machine can take care of all filing and lapping jobs as they come along. Upper table may also be used for compound angles.

- Ball Bearings Throughout Machine.
- Fully Enclosed Motor and Drive.
- No Dripping of Oil.

Write for descriptive circular.

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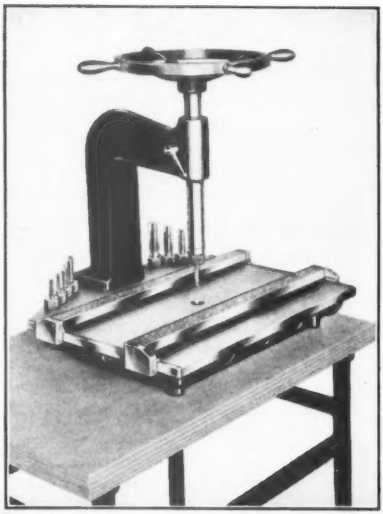

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● And the Viking Tapper, a precision built tool, will also help make weapons. It eliminates tap breakage, thus enabling the use of high speed ground threads and cuts hand tapping time.

The base is semi-steel casting, well ribbed and seasoned to prevent warping. Two sliding parallel bars hold work in place while tapping. Quick changing adaptors, requiring but 5 seconds to change tap, are provided. The steel spindle is hardened, ground and lapped to a perfect gage fit. A spindle lock holds the spindle in position. *Send for illustrated circular*

THE VIKING TOOL & MACHINE CO.
6 Main Street Belleville, N. J.

SHOP AIDS

AMERICAN STANDARDS LIST FOR 1942—The American Standards Association recently announced the publication of its new list of American Standards. Nearly 500 American Standards are listed in a wide variety of industrial fields. There is a separate heading for American Defense Emergency Standards and, for the first time, all American Safety Standards are listed together in a separate section.

These standards include definitions of technical terms, specifications for metals, methods of test for the finished product, dimensions, safety provisions for the use of machinery and methods of work. They reach into every important engineering field, serving as a basis for many municipal, state and federal regulations.

The standards are frequently reviewed and revised in order to keep them in line with changing industrial needs. New standards and those brought up to date within the year are especially marked in the list. This list will be sent free of charge by writing the American Standards Association, 29 W. 39 St., New York, N. Y.

PRODUCTION ENGINEERING—As the title of the book indicates "Production Engineering" covers the entire field of production. Beginning logically with design and equipment, it carries the readers through many interrelated stages to the final but continuing problem of product development.

This volume has been written expressly to point out the relationship of the many basic technical elements of production engineering. No attempt has been made to treat in detail any part of this work but to emphasize the importance, at all times, of their relationship.

The work of production engineering is presented as the coordinated efforts of many individuals, each of whom has a specific task to accomplish. These tasks involve not only the obligation of carrying through the work in conformity with the plans of those who have completed the earlier stages but also the responsibility of reporting back to those collaborators the results of their joint effort.

Author: Earle Buckingham, Professor of Mechanical Engineering, M.I.T. Price, $2.50.

FREE EDUCATIONAL CALENDAR ON MACHINE TOOL AND MACHINE SHOP PRACTICE—This calendar contains 12 comprehensive lessons on metal working. It gives a complete short course on the eleven basic types of machine tools. The "Machine Tool and Chip Production" pictures used to illustrate the calendar are colored in black, blue and red. Red is used to emphasize the cutting tool of the machine; blue for the material cut; and black for the machine itself. Material cut by each machine is highlighted by photomicrographic studies.

The calendar, measuring 40" x 22", can be seen across a large room. A strong metal binding permits hanging of the calendar indefinitely without sagging or curling of the pages. Special wear resisting paper makes possible the preserving of the pictures for charts or posters. Free calendars can be obtained by writing Continental Machines, Inc., 1303 S. Washington Ave., Minneapolis, Minn.

MACHINE SHOP WORK—The author, John T. Shuman, takes up in the book approved shop methods, including the construction and use of tools and machines.

Several helpful features are used which are unique. The trouble-shooting pages at the end of each chapter give the cause and remedy of the most common operating difficulties encountered with the machine tool under discussion.

Machine construction is dealt with adequately, but it is the use of tools and machines and the operation of machine tools in common use that are stressed throughout, with attention to their conservation, care and safety of operation.

"Machine Shop Work" is available from The TOOL & DIE Journal, 2460 Fairmount Blvd., Cleveland, O. Price, $3.50.

GAGES, JIGS AND FIXTURES—prepared by Edward Griffiths, Director, Time Study and Methods Department, Westinghouse Electric & Mfg. Co., and I.C.S. Staff, this clear, shopwise book is divided into three parts—gage making, jigs and fixture types and designs, and jig making. "Gages, Jigs and Fixtures" is published by International Textbook Co., Scranton, Pa. Price $2.25.

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MILLING MACHINES and ATTACHMENTS

Designed especially for the profitable handling of small and difficult work on a production basis. Burke Milling Machines are available in sizes Nos. 1, 2, 3 and 4, all motor driven.

Illustrated No. 4 Motor Driven Machine mounted on cabinet column. Write for complete details.

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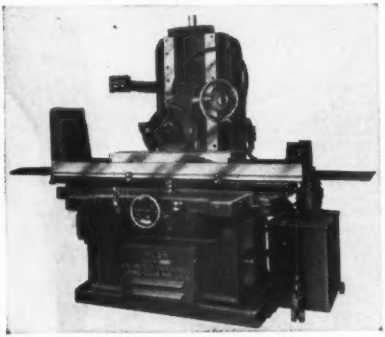

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SURFACE GRINDERS

Provide for Tool Room Accuracy at Production Speeds Built in Many Sizes

New Bulletin GL-100 on Request

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304 Straight Ave., S. W.
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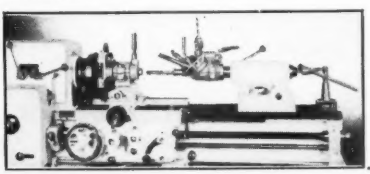
SAVE TIME ON DEFENSE WORK

DON'T WAIT FOR TURRET LATHES

Convert your present lathe into a Turret Lathe in 15 seconds by attaching this Turret to the Tailstock Spindle of your engine lathe. Five tools automatically center when brought into play. Made in 4 sizes to fit lathes with 24" swing down to the small bench lathes. Also make Tool Post Turrets, and Adjustable Pull Feeds, Milling Machines, Milling Machine dividing heads, vises, etc., Swing Frame Grinders, Belt Sanders, Foundry Riddles, etc.



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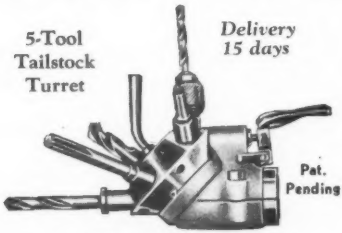
Delivery 15 days



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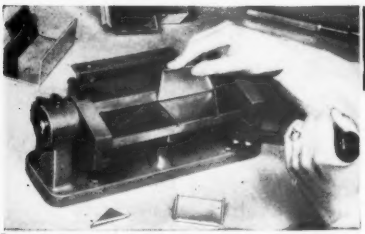

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Are you in a rush for some duplicated metal parts? Do you have experimental work? In many cases you can make the parts faster with the "Di-Acro" System, avoid entirely the expense and delay of making dies. An almost unlimited variety of work can be rapidly done by the combined use of 3 Di-Acro Precision Units,—Shear, Brake, Bender.

WRITE FOR CATALOG — New 32-page catalog "Metal Duplicating Without Dies" gives full details, shows many parts which can be made.

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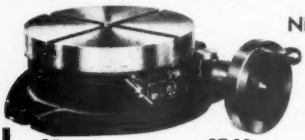

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FAST DELIVERY GUARANTEED

Our rotary table will take the place of a costly fixture. It is used for all kinds of work on milling machines, shapers, drill presses and horizontal boring mills.

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WE CAN ALSO FURNISH DIVIDING ATTACHMENTS

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CONSERVATION

Good cutting and forming tools conserve material and increase war production.

Let Columbia men help you conserve with recommendations for making the most out of your tools.

It pays to use Good Tool Steel.

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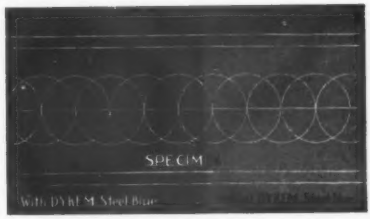

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Simply brush on; ready for the layout in a few minutes. The dark blue background makes the layout lines show up in a sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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with turns rods. Measures depths of holes and slots from zero to 3" by thousandths. Locks at any desired point. See your dealer and write for catalog.

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BROKEN TAPS

Quickly
Insert WALTON Tap Extractor and back out broken piece. No annealing—no drilling.

Easily
Tap Extractor and Tap Wrench are only tools needed.

Safely
Threads are not damaged. Not necessary to tap oversize after broken tap is removed.

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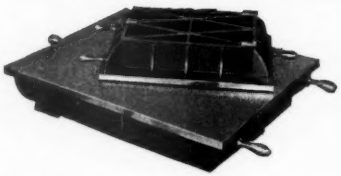

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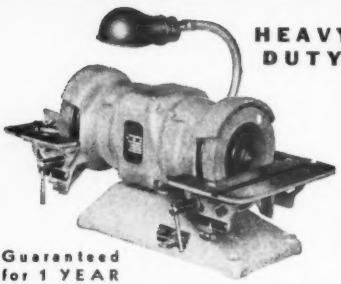

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Guaranteed for 1 YEAR

For accurately and quickly sharpening Carbide Tools, use the BALDOR special carbide tool grinder; ½ HP ball bearing reversible motor; adjustable tables and tool rests; 6" Silicon Carbide wheels. Price, complete as shown above, **$95.00**

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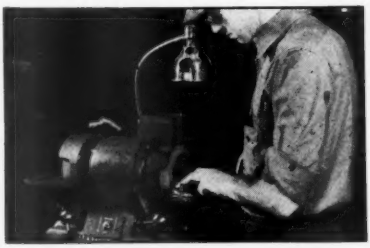

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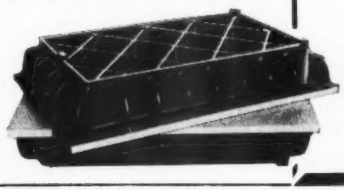

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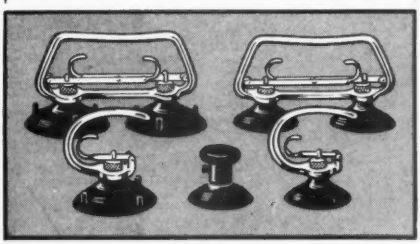

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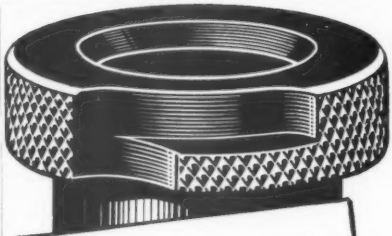

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(Continued from Page 77)

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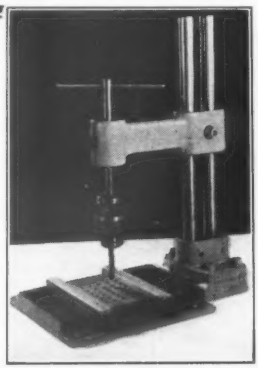

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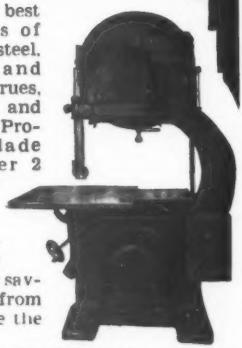

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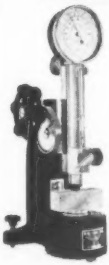

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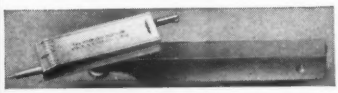

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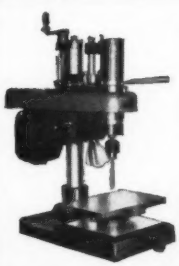

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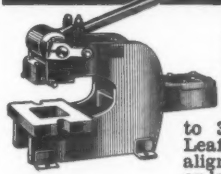

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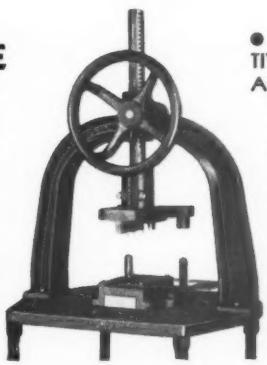

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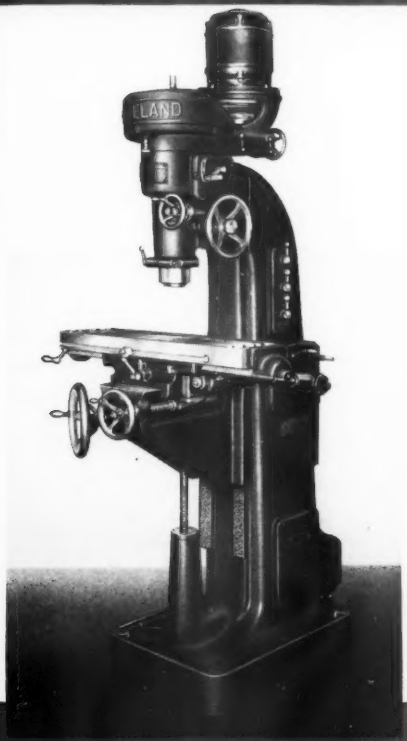

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